Science and Technology Parks
Global Best Practices and Key Success Factors Report

Prepared for the

Government of Santa Catarina
State, Brazil

including the

Sapiens Parque Technology Park
Authority

GLOBUSTRAT Consulting Group
Transnational Executive MBA (TEMBA)
College of Business and Economics
California State University, East Bay
March 21, 2006

GLOBUSTRAT CONSULTING GROUP

Transnational Executive MBA (TEMBA)

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Executive Summary

Fundação Certi (The CERTI Foundation), in partnership with the State of Santa Catarina and its associated agencies (particularly the Sapiens Parque Authority herein referred to as "Sapiens Parque") commissioned the GLOBUSTRAT Consulting Group to conduct a research study to understand Global Best Practices, Investor Requirements, Global Financing and Marketing practices of technology parks worldwide. The GLOBUSTRAT Consulting Group assumed this study under the auspices of the Global Business Strategy Consulting (GLOBUSTRAT) program. GLOBUSTRAT is a key component of the Transnational Executive MBA (TEMBA) program offered by the College of Business and Economics at the California State University, East Bay (CSUEB). This study examines the global technology park industry (including global financing and marketing) and provides Sapiens Parque with information on best practices and key success factors (KSFs) for optimal technology and innovation park development. The key areas as outlined in this executive summary are as follows:

- Sapiens Parque's Objectives For This Study
- Research Methodology
- The GLOINTECH Model of Technology Parks
- General Overview of The Global Technology Park Industry
- Financing of Technology Parks
- Identification of Key Success Factors
- Identification of Key Success Factors to Parks and Tenant Firm Financing
- Marketing Strategy for Technology Parks
- Santa Catarina and Brazil's Endowments
- Recommendations

Sapiens Parque's Objectives For This Study

The primary objective of this study was to provide Sapiens Parque with recommendations for optimal park development, management and marketing that may enable them to:

- make Sapiens Park relevant and different by integrating the concepts of knowledge (Scientia) and human experience (Experientia) into a single innovation park.
- gain Sapiens Parque, Florianopolis, Santa Catarina, and Brazil world-wide visibility and recognition for innovation and technology.
- strategically leverage the financial resources and human gifts of Santa Catarina and Brazil to continue development of state and country.

In order to achieve these management objectives, the research team developed the following research objectives to define the scope of the study:

- Provide profiles of technology parks by supplying a comprehensive analysis of the size, composition and structure of the technology park industry worldwide.
- Provide a clear understanding of the specific key business sectors for Sapiens Parque and the Santa Catarina Government to target.
- Provide a clear understanding of the supply chain/distribution/logistics necessary to reach the firms that are targeted as potential investors and participants in Sapiens Parque.
- Recommend financing options to Sapiens Parque management by investigating alternative modes of financing and related best practices as follows:
  - Government financing of infrastructure, venture capital, angel financing, leasing, equity capital, bank capital and other types of funding sources.
  - Best practices in technology firm financing and firm exit strategies such as IPO's, acquisitions, mergers, spinouts and corporate venture capital.

  - Suggestion of an appropriate mix of financing options for the Sapiens Parque management to adopt in order to provide short-term, medium-term and long-term funding.

- Identify the Key Success Factors ("KSFs") that are instrumental in the success of such parks.

- Recommend a marketing strategy to the management of Sapiens Parque.

- Recommend an optimal development strategy for the creation and growth of a successful technology park including:

  - Models, characteristics, and profiles of technology parks that have succeeded including:

    - Elements of available services, rivalry, company concentration, proximity to markets and networking.

    - Importance of specialization, innovation, promotion, and management.

    - Involvement by educational institutions and the interdependency among stakeholders.

    - The key traits of the industries present in the parks.

    - The specific role of the government in those parks.

    - The historical evolution of the technology parks and their future prospects.

- Identify the key U.S. and Canadian firms and business/government organizations to target as potential investors and participants in the Sapiens Parque.

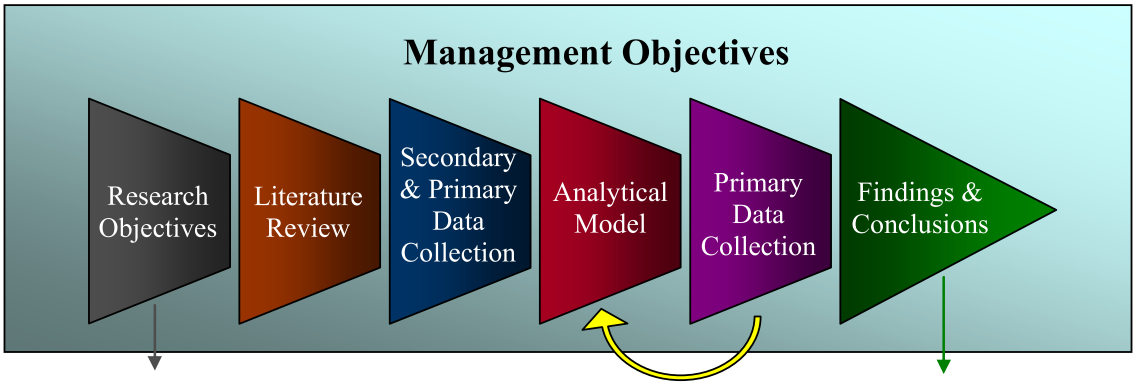
- Provide the names and addresses of the key contacts in the target firms and organizations including (on a best-effort basis) facilitation of meetings with key-decision makers.

- Provide contact information for technology park development officials, local technology park authorities, and technology park experts worldwide.

Research Methodology

We conducted both quantitative and qualitative analyses of a variety of data collected from various primary and secondary sources. The approach we followed to execute this research study is depicted in Figure ES-1.

Figure ES-1: Research Approach Followed in This Study



With knowledge of the management objectives and definition of the research objectives, we initially conducted an extensive review of the extant literature on technology parks. The literature we reviewed included both printed and electronic media. We complemented our preliminary research of literature with the collection of primary data obtained from expert interviews and field visits to technology parks in the Silicon Valley, California, and overseas (Thailand, Taiwan etc.). We used this acquired knowledge to form the basis for the GLOINTECH analytical model that we developed to help identify the factors that impact technology park performance. This model is explained next.

GLOINTECH Model of Technology Parks

Our literature review regarding the causes of locational success helped identify the key factors that may affect success of technology parks. This review included examination of the "new institutional economics" literature and the literature on economic geography. We also examined the major models that explained the formation and success of clusters such as:

- Alfred Marshall's "Industrial Districts Model"
- John Dunning's "Eclectic Model of international production location"
- Michael Porter's "Four Diamonds Model"

We focused on understanding the limitations and exclusions of these models and identified the key missing elements that we believed would impact a technology park's success. With these key missing elements identified, we presented a more comprehensive model of technology park success that substantially and critically extends Porter's four diamonds to include eight factors that had not been previously integrated in to the technology park or cluster modeling literature. As a result, our Global Integrated Technology ("GLOINTECH") model, shown in Figure ES-2, consists of twelve variables (Porter's Four Diamonds Model. This revised model included our eight additional General Economics and Management System (GEMS) factors. These eight GEMS are:

"Hard" Factors GEMS

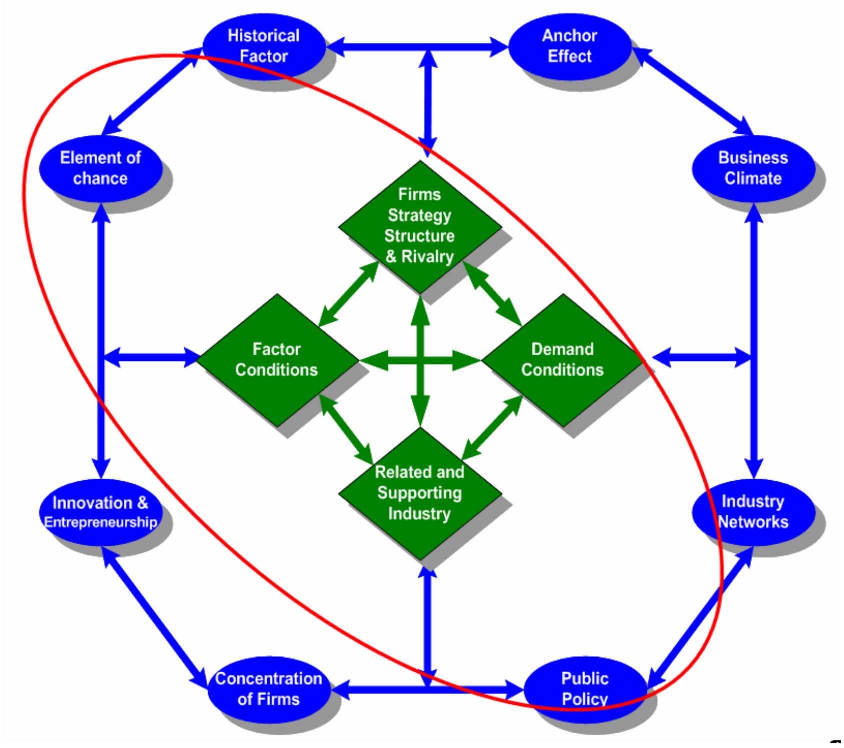
- Public Policy
- Anchor Effect
- Concentration of Firms ("Agglomeration")
- Historical Factors ("Path Dependence")

"Soft" Factors GEMS

- Business and Socio-political Climate
- Innovation and Entrepreneurship
- Industry Networks
- Element of Chance

While Porter discussed two of these eight additional factors (public policy and the element of chance) he underplayed their importance and excluded them from his model.

Figure ES-2: GLOINTECH Technology Park Model



Source: GLOBUSTRAT TEAM, California State East Bay, TEMBA Program

We used data collected from a worldwide sample of technology park managers and tenants to empirically test our model in order to identify the KSFs of technology parks

General Overview of the Global Technology Park Industry

The overview of the technology park industry worldwide is separated into three sections:

- Nomenclature of Technology Conurbations
- History of Technology Parks
- Overview of the principle features and best practices in Technology Parks

In order to define and place technology parks in their proper context and in order to frame our discussion of firm and technology conurbations, we provide definitions and terminology associated with technology conurbations as follows:

- **Technopoles** – Large areas possibly expanding multiple cities that offer attractive environments and technology transfer services.
- **Technology Parks** – Covering only a medium expanse, technology parks focus on the transfer of technological innovation and accommodate companies that are involved in the application of high technology involving R&D, production, sales and servicing.
- **Science or Research Parks** – Comparable in size to technology parks and seek to develop SMEs; although science and research parks can be synonymous with technology parks, science or research parks usually locate within or near a university or research institute.
- **Innovation Centers and Business Incubation Centers (BICs) –** Geographically smaller (30,000 square meters), these promote the creation of advanced technology through a focus on new enterprises with unique technological ideas that are likely to lead to a new and marketable product.

Origins of the technology park concept can be traced back to the 1950s with the establishment of the Stanford Research Park in Palo Alto, California, and the Research Triangle Park in North Carolina. The phenomenal (subsequent) success of Silicon Valley and the Stanford Research Park opened the door to the worldwide expansion of similar technological capacity and economic expansion initiatives in the form of new technology parks (and other similar vehicles). Seventy-eight percent of today's technology parks were established during the 1980s and 1990s. However, the current growth rate (estimated to be 58% in the 2000s) is on par with that of the 1990s. Tenant focus differs between technology parks and science/research parks whereas a mix of IT and Biotechnology represents 47% of tenant firms in technology parks it represents 80% of tenant firms in science and research parks. There are over 500 science and technology parks worldwide with the majority located in the U.S. (which tend to be the largest), Europe, and Asia. Science and technology parks in the EU use either a property-led (France, Spain), technology-led (Greece, Italy) or a cluster-based (Germany, Sicily) park strategy. While parks in both the U.S. and EU have strong university links, this is more prevalent in the U.S. and has been decreasing in the EU. Most research, science and technology parks, in Asia, are built either as part of government initiative or privately owned.

A major objective of this study was to understand the global best practices and KSFs of technology parks in the world. The best practices and KSFs/KFFs in each region are summarized as well as the major features of the technology parks in each region are isolated. The major best practices and KSFs contributing to the technology park's success can be summarized as follows:

North America:

- Presence of social and economic networks and linkages
- Presence of high quality of life and a mobile work force
- Presence of transportation and technology infrastructure
- Presence of culture of innovation and risk taking
- Collaboration between businesses, academic and public resources (have been most helpful for tech park success).
- Many science and technology parks coordinate with private high-tech firms.
- Existence of supporting institutions and ancillary services.
- Government has been supportive and facilitating not directive or interventionist.
- Successful U.S. and Canadian clusters tend to be organic.

Europe:

- Presence of local demand markets
- Existence of investment incentives and related-aid to attract tenant firms
- National and regional regulations for FDI exist
- Market-creating and facilitating public policy has played a critical role in development of technology parks/clusters.
- A lack of a culture of innovation and risk taking has been a hindrance to European technology park and cluster success.

Asia and Oceana:

- Abundance of specialized / quality labor at competitive price
- Presence of a highly mobile work force
- Existence of government initiative & support
- Collaboration between Universities or Businesses is very minimal and primarily driven by the cost factor and proximity to the developing market.
- Presence of supporting institutions and ancillary services necessary for tech park success.
- Anchor effect plays a major role in the success of the park.
- Parks focus on few selected areas (Software, Manufacturing etc.)

A summary of case studies of one successful park and one unsuccessful park, in each region, are included in chapter 4. Our study included detailed profiles of over 30 major technology parks. These profiles can be found in Appendix 1.

Financing of Technology Parks

We identified essentially three aspects to the financing of technology parks. These aspects include:

- Financing of the initial investment of the technology park
- Financing for continuing operations
- Financing of tenant companies

The costs and methods of developing and financing technology parks vary from country to country. Nevertheless, the creation of a successful technology park by any standard is a costly endeavor. The costs of development are usually much greater once buildings are considered as part of the development. It needs to have the appropriate infrastructure to support growth. The provision of reliable infrastructure (e.g. utilities, emergency response) increases the attraction of the park to research and technology organizations, which leads to the likelihood of high occupancy. Initial expenses include start up costs relating to the feasibility studies, market research, physical planning, promotion and administration. Government may engage directly, through provision of land, financial incentives, or negotiations to attract anchor tenants, or indirectly through provision of normal infrastructure.

A technology park represents a major investment which spans several decades. Adequate continuing or renewable financial resources are required to provide satisfactory services to tenants and maintain proper operations of parks. In addition, because tenant firms are the life-blood of a technology park, the park management must do their best to facilitate the fundraising needs of their tenants.

Technology park ownership and operational structure typically follows four main models:

- Public or not-for-profit technology parks
- Private technology parks
- Academic institution-related technology parks
- Hybrid technology parks

Public or not-for-profit technology parks and incubators are usually sponsored by governments and not-for-profit organizations and serve primarily the purpose of local economic development such as job creation, economic diversification and/or expansion of the tax base. Private technology parks are initiated and developed by private investor groups, real estate development companies and large private companies for profit. They are created with the objective of generating market returns to their shareholders or owners. While our research and analysis indicates that, except for government R&D loan programs, the largest source of technology park funding is private. We list the major sources of technology park funding in Figure ES-3.

Figure ES-3: Major Sources of Technology Park Funding

▪ Grants and gifts ▪ Sponsorship ▪ In-kind support ▪ Soft loans	▪ Commercial loans ▪ Commercial leases ▪ Income for services provided ▪ Rental Income	▪ Revenue sharing with partners ▪ Shareholder funds ▪ Equity participation with client companies ▪ Royalty Agreements

Identification of Key Success Factors

In our GLONINTECH park model presented in an earlier chapter, we identified 12 factors that we believed were essential for the success of any technology park. In order to identify the relative role of these 12 factors in influencing the success of parks, we used the following measurement model.

Relative Success of a Park = f (Relative Presence of 12 Factors In A Park)

In this measurement model, the dependent variable is the relative success of the park. The independent variables are the relative presence or absence of each of these 12 factors, from the model. Using our Worldwide Survey of Technology Park Managers and Technology Park Tenants, we collected relevant data on the relative success of their parks and a variety of other factors that may be responsible for their success or lack of success. Based on the regression analysis of park success data (based on a set of 15 variables representing these 12 factors), we showed that, although relative importance varies, all the 12 factors presented in our theoretical model are important KSFs. In order to address the problem associated with multicollinearity of independent variables we factor analyzed 15 variables and reduced them to four factors as follows:

- Factor 1: Business Environment and Labor
    - Socio political climate
    - Government/public policy
    - Business climate
    - Labor

- Factor 2: Park-specific Endowment
    - Historical factors
    - Inter-firm linkages
    - High concentration of firms
    - Element of chance
    - Local innovation & entrepreneurship

- Factor 3: Co-opetition and Demand
    - Competitors/collaborators
    - Suppliers and related industries
    - Market demand

- Factor 4: Input Prerequisites
    - Captial
    - Infrastructure
    - Leading/anchor firms

Our results show that all the 12 factors included in our conceptual model are key success factors although their individual contribution to success varies. The government definitely plays an important role in promoting the success of parks.

In addition to identifying KSFs, we have also identified so called key failure factors (KFFs) which are likely to discourage firms from locating in parks. For example, our research and analysis indicates that both park managements and tenants believe the high cost of entry and operation (fees, taxes, real estate rent, labor) in a technology park to be critical factors that may to discourage firms from locating in a park. Similarly, the lack of infrastructure and facilities (including laundry services, medical facilities, public transportation systems, etc.) were also identified as critical factors.

Key Success Factors to Parks and Tenant Firm Financing

Availability of funding is a significant barrier to the future growth of both technology parks and tenant firms. Many sources of financing for technology park tenants (including: private venture capital and equity financing, commercial bank loans, government loans and R & D grants, etc.) tend to be "stage" specific to the firm. Given the increased risk inherent in technology-based businesses, Venture capital is especially important to technology park firms. Venture capitalists use industry-focused investment models to seek quick and sizeable returns and, unlike traditional financing sources (banks, etc.) tend to take an active interest in the business operations of the firms they invest in. Much of the added-value that venture capitals bring to the technology industry is their ability to work with firms as directors to monitor, consultants to assist in the recruitment of management and provide other support services. The unique skill set requirements and tolerance for risk offer some explanation to why some regions of the world have smaller and less developed venture capital industries.

Despite their tolerance for risk and failure, Venture Capitalists do manage their risk portfolio by investing a majority of their funds in more established firms that have, at least, reached the expansion phase. The exception to this trend occurred during sustained industry boom cycles such as the recent internet and dotcom boom of 1998-2001. Informal networks of investors, called Angel investors, are critical to early stage firms and act as a bridge to venture capital. Corporations also provide venture capital for early-stage companies; however they tend to invest for the strategic purpose of gaining access to technology or industry insight and not financial gain. For venture capital to work well, there must be a continual flow of new firms that meet venture capital investment criteria, and as important, there must be a viable path for the venture capital to exit the investment. Exits are usually done through merger and acquisition (M & A) or initial public offering (IPO) which requires secondary stock markets.

Government policy is an important driver of venture capital and can impact the relative size and robustness of the local industry. An example is when ERISA laws (in the U.S.) were changed to allow pensions funds to invest in venture capital. Tax policies are also an important driver for venture capital and can help create a favorable environment. However, too much government intervention “crowds out” private sector participation and creates an inefficient industry totally dependent on government support.

On a global perspective, the venture capital industry is cyclical. However, despite the dotcom bust, venture firms continued to increase their size and share in the economy. The largest and most successful venture capital industry in the world is in the U.S. where venture-backed firms outpaced the national economy and posted substantial wage increases in the last three years. Venture capital supports U.S. global competitiveness and has allowed the country to improve its income and standard of living over most other advanced economies. The global trend in venture capital shows heavy investment in high-technology. Israel, on a percent of GDP basis, leads the world in venture capital investment in high technology, followed closely by the United States and Canada. Korea, one of the least developed countries in the OECD, has an exceptional venture capital industry when measured as a percentage of GDP.

The U.S. venture capital industry is experiencing its first sign of growth since the collapse of the dotcoms. Several trends have emerged over the past five years. Investment flow has recently shifted towards life science (sector is at a five-year high) and wireless and somewhat away from software and networking.

There is also recent shift towards investment in later-stage companies. Private equity funds continued to outperform the public markets (20 year returns of approximately 15%). Business angel investing has grown considerably from an estimated 50 formal networks to over 170.

The Asian private equity market is growing rapidly as Asian companies set the pace for global expansion. Whereas pension funds are the main source of venture funds in the U.S., they only represent 17% in Asia with the majority sourced from corporations (34%) and banks (19%). Japan and China are the leaders in investment and funds under management; however Korea has the highest as a percent of GDP. Unlike the U.S., traditional industries, in Asia, such as financial services and transportation attract a majority of the funding (60%), although IT is more of a focus in China and Korea. While fundraising in Australia has shown signs of slowing, China and India are expected to expand. Government is a key source of funds in several Asian countries and has led to success in the case of Hsinchu (Taiwan).

Bank financing is heavily used in Europe and, although it is a well developed industry. Venture capital represents only 2% of all funds. Differences in the private equity industry between EU countries are distinct and reflect political and economic conditions. The United Kingdom has the largest private equity market in Europe. European private equity has a much greater focus on buy-out than in the United States and, like Asia, venture capital tends to target traditional mainstream industries. In Europe, banks are the largest contributor of funds to private equity making up 22% of total funds with pensions coming in second with 19% of funds. Corporate venture capital plays a significant role and tends to focus more on start-up and expansion phase investments.

Marketing Strategy for Technology Parks

Our research focused on the elements of Product, Promotion, Price and Place as they pertain to technology parks. We focus on the immediate question of how to promote Sapiens Park based on the results of our Worldwide Survey of Technology Park Managers and Technology Park Tenants.

Promotion

The Product of technology parks is essentially the services and characteristics related to the park. Their simplified customer base, depending on the type of park, includes a mixture of public and private firms (at various stages of development), and other public and private institutions. Science parks can be positioned in the market to solve many problems faced by start up companies or mature technology companies. Among the top reasons for locating in technology parks include:

- Location of the park
- The image or reputation it gives the company
- Proximity to the customers or suppliers targeted by the company
- Proximity to goods and services required by the company
- Access to pools of highly-skilled labor
- Room for expansion
- Proximity to venture capitalists, other financing sources and professional services

Analysis of the results from our Worldwide Survey of Technology Park Managers and Technology Park Tenants indicates that two things are essential for a successful technology park promotion campaign to take effect. First, the technology park management must have direct contact with prospective clients and make forceful representations to persuade them to locate and invest in the park. Second, existing park clients must be satisfied enough to make a positive referral to others.

Pricing

Technology parks have a mix of services that must be bundled and priced appropriately in order to maximize revenues necessary for operating the park in a quality-oriented and responsive manner. Expense related to key functions, deemed important to attract and retain tenants, must be covered on a continuing basis. Some of these activities include:

Park promotion to identify and securing tenant companies

Facilitating important links and collaboration between tenant companies, universities, research and development facilities and industrial enterprises

- Assisting start-up high technology companies with business plans and problem solving
- Planning, land and building management
- Park maintenance, upgrade and expansion

Place (Distribution)

Based on the product definition, of technology parks, given in this study, the line between promotion and distribution becomes very blurred. The "distribution process" is initiated with the contact and promotion made with the prospective tenant and ends once the tenant makes the decision to locate in the park. The technology park industry is a "high-touch," highly relationship oriented industry. Many of the influencers in the decision making process are real estate agents or brokers. The channels of distribution are essential those that are involved with the promotion of the park.

Positioning of Technology Parks

The combination of the four marketing mix variables in implementation along with the relative image position that a technology park wants to create constitutes the positioning of the technology park. While this requires a full-scale analysis by itself we provide some guidelines in this section for Sapiens Parque based on our analysis of the positioning of some of the world's leading technology parks. In order to understand how some of the world's leading technology parks position themselves we examined ten technology parks by collecting their sales collateral, evaluating their websites and scouring the secondary literature to understand how they were positioned.

Santa Catarina and Brazil's Endowments

Brazil is the fourth largest nation in the world in terms of land mass and the sixth largest in terms of population. Brazil's government is a Federative Republic with an Executive, Legislative and Judicial branch. Some of the country highlights pertinent to this study are:

- The most advanced technological nation in Latin America accounting for 70% of South America's GDP
- The only country in Latin America with its own satellite manufacturing and launching program (multiple satellites launched)
- Second largest depository of structural genomics research in the world
- Third largest manufacturer of aircraft (3610 planes delivered to 50 countries) and electrical motors in the world (Santa Catarina State)
- Fifth largest manufacturer of steel in the world
- Brazil has over 1,280 higher education institutions and R&D centers
- One of the world's largest communities of over 70,000 Java Engineers developing applications for medical, telecommunications, financial and government services for leading international firms
- Brazil has over 18,000 systems engineers and the largest JUG (Java Users Group) in the world

Thus, Brazil can be seen to have substantial assets in terms of skilled labor, advanced technology, large engineering and industrial base, world-class institutions of higher education and world-leading industries. This allows it to be ranked among countries like China and India in terms of its unexploited development potential.

Santa Catarina is located in southern Brazil between Rio Grande do Sul and Parana. Geographically, Santa Catarina's is flanked by the Atlantic Ocean on the east, prairies on the west and forests in the north and south. Santa Catarina's location is strategic to the dynamic markets of Chile deep water ports and shipping access of the Atlantic Ocean. It boasts a diverse population of more than 5 million people with deep roots of European, Japanese and Arabian influence and it has one of the highest standards of living in Brazil. Santa Catarina makes up a large portion of Brazil's economic strength. Although the state Government is supportive of business its bureaucratic and regulatory methods can be a hindrance.

Recommendations

Recommendations pertain to the following areas. These are the major areas and the summarized recommendations:

Target Industries

Strong industry candidates based S.C. endowments and demand:

- Agribusiness
- Food technology and food processing
- Aquaculture
- Electric, Electro-mechanical and Electronic industries
- Software services outsourcing
- Chemical
- Ceramics

Challenging industry candidates:

- Tourism
- Sports technology

Park Financing

- Demand-pull
  - Build-as-you-go, finance as you go
- Diversify revenue sources
  - Buildings
    - Bonds with State Guarantee
    - Short-term lease
    - Ownership and use
    - Government funding
  - Operations
    - Sponsorship
    - User fees
    - Charged for services

Tenant Financing

- Establish Angel Network, Facilitated by Park
- Government R&D funding (INOVAR)
- Locate commercial lending institutions on site
- Network with foreign venture capitalist
- Establish loan guarantee programs
- Non-financial services typically provided by VC/Angel

Park Management

- Minimize costs to park tenants: fees, taxes, etc.
- No taxes on processes and inputs, tax profits
    - Attraction of tenants
        - Enhance location of the park
        - Government support
        - Public – private partnerships
        - Bundled services
        - Common R&D & office center
- Promotion
    - Integrated promotion plan
        - Differentiating e-Business portal
        - Join IASP
        - Road show/site visit and attend targeted industry trade shows
        - Improve sales collateral
    - Develop strong relations with local or regional brokers
    - Open international sales offices in proximity of targeted industries
- Retention of tenants
    - One-Stop-Shop
    - World class operations management

  - Production oriented facilities (non R&D focused)
  - Support services (tax, legal, accounting)
  - Pricing

Park Development Strategy

- Develop financing plans
- Develop world class infrastructure
- Where government should not be involved:
  - Avoid setting up production-type operations
  - Rapid privatization of government funded financing programs
  - Avoid conflicting policies between federal, state and local government
- Public Policy
  - Fast track business licensing and permit process
  - Facilitate streamlined visa processing
  - Facilitate streamlined immigration and entry
  - Strong IP & private property protection
  - Fully TRIPS compliant (at the Federal level)
  - Tax laws and incentives

Industry and Company Follow-up Opportunities

List of Target Companies

- Potential Anchor Tenants contacts facilitated by GLOBUSTRAT team:

    - Sun Microsystems (MOU in place)

    - IBM and Cisco Systems (MOU in progress)

    - Intel Corporation

    - Sybase

Asia

- Agi – Pacific Agriscience

- Food Tech – Fontora

- Electronic – D-Link

- Alt. Eng. - Bhagwan

Europe

- Health – Seimens AG

- Bio – Neuraxo Bio Tech EMBA

- Health – GlaxoSmithKline Oral Care

List of Supportive Industries

- Legal, accounting, consulting, logistics and human resources

Contact Names

- See Appendices 2 and 3

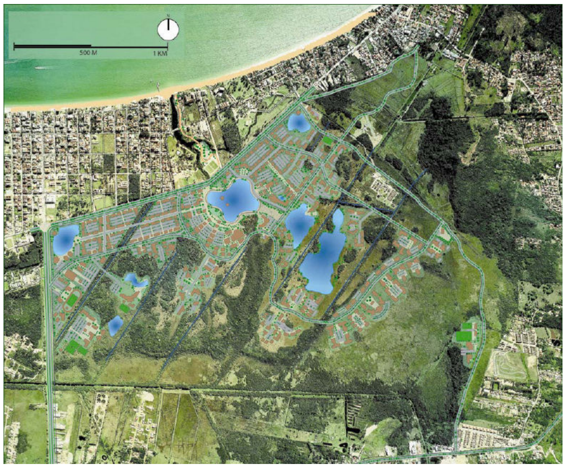
Chapter 1

1.0 Introduction

1.1 Overview

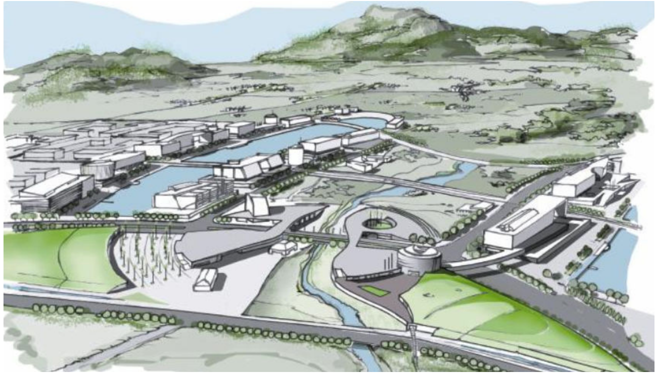
Sapiens Parque is a 2500-acre (4.5 million m²) development project located in the island-city of Florianopolis, the capital of Santa Catarina State, Brazil. Sapiens Parque is located 25 kilometers from the city's center in the northern portion of the island. The land on which Sapiens Parque rests is owned by the Santa Catarina Development Company (CODESC) in partnership with the State of Santa Catarina[1,2] (see Figure 1-1)

Figure 1-1 Sapiens Parque Area



Source: Sapiens Parque

Figure 1-2 Phase 1 - Perspective Overview



Source: Sapiens Parque

Designed to be more than just a technology park, Sapiens Parque is planned and promoted as an **innovation** park. Planned in stages (see Figure 1-2 for an overview of Phase 1) and intended to provide a next-generation home for its tenant firms, Sapiens Parque will also offer facilities where tourists and the local population can actually experience the science that is under development in the park. Sports, entertainment, shopping, dining, and lodging will also be available. The goal is to create a "technologically advanced community of industries and activities that also meets the highest standards of sustainability"[2].

In the Spring of 2005, California State University, East Bay ("CSUEB") was engaged to conduct a research study to understand Global Best Practices, Investor Requirements, Global Financing and Marketing practices of technology parks worldwide. The study will provide Sapiens Parque with recommendations on what they should do for optimal park development, management and marketing in order to become the leading technology and innovation park, in Latin America, and a magnet for leading technology firms from all over the world. The research study was conducted for Fundação Certi ("The CERTI Foundation"), in partnership with the State of Santa Catarina and its associated agencies, particularly Sapiens Parque S.A. which was established for this purpose. It was conducted by three teams of mid-career and senior executives enrolled in the Transnational Executive MBA (TEMBA) Program at CSUEB, as part of their program requirements. This research report contains the findings, conclusions and recommendations of this research study.

The study examines technology parks on a global basis and provides the Sapiens Parque Authority S.A. with information on best practices and key success factors ("KSFs") of these parks. It also addresses the global financing alternatives used in technology parks worldwide and recommends financing plans best suited for Sapiens Parque. The study considers various aspects of marketing and promotion of technology parks and suggests implementation measures Sapiens Parque management can take to improve the visibility and attraction of the park to potential investors and tenant companies.

In this chapter, we present the primary goals of The CERTI Foundation and its partners in commissioning this study and the research objectives that guided the research team (during the process of conducting this research study). A brief profile of the Sapiens Parque is presented especially for those who may not be familiar with its characteristics. We also present the concept of the Global Business Strategic Consulting (GLOBUSTRAT) Program, a component of the TEMBA program of CSUEB. TEMBA participants conducted this study and prepared this research report. We present a brief profile of the Cohort 8 TEMBA participants who conducted this study.

This research report is organized into ten chapters. A brief description of each chapter is presented so that the reader knows where to look for specific information. A summary at the end closes this chapter.

1.2 The GLOBUSTRAT Concept

The Global Business Strategic Consulting (GLOBUSTRAT) Program, a unique California-based strategic consulting program offered by the College of Business and Economics at California State University, East Bay, is offered under the auspices of the Transnational Executive MBA (TEMBA) Program. The TEMBA program enrolls mid-career and senior executives, from leading technology, consumer and service industry companies in the United States, who participate in a 13 month series of specialized global class modules while conducting strategic consulting studies from non-U.S. based companies as part of the requirements for successful completion of the program.

The GLOBUSTRAT Program is part of a cluster of global consulting programs conducted by the College of Business and Economics, which has extensive experience in conducting strategic market entry and strategic alliance studies for companies in Europe, Asia and South America with a broad network of both industry and government contacts. The College also has extensive international business development expertise in North America and elsewhere. Previous projects conducted under the auspices of identical programs include strategic industry analysis, strategic market entry and strategic alliance studies conducted for over 100 firms in Austria, Belgium, Chile, Brazil, China, India, Indonesia, Philippines and Thailand with over 115 products, services and projects studied.

The principals of the GLOBUSTRAT program and the program itself have widespread global experience in conducting extensive research studies for the establishment of high-tech technology and business clusters, foreign direct investment zones, stock exchanges and financial institution best practice studies, and for conducting feasibility studies for World Trade Centers and business incubators. The principals of the GLOBUSTRAT program completed a Global Business Incubator Benchmarking Study for the Instituto de Pesquisas Technologicas ("IPT") at Fondacion Universidad Regional de Blumenau ("FURB") in Blumenau, Brazil in 1999 and a Study for the Establishment of World Trade Centers for a private client in India in 1995.

Under the aegis of the GLOBUSTRAT program in 2001, the principals completed a Global Best Practices Study for the Establishment of a High-Tech Business Cluster in the Province of Styria in southern Austria for the Office of the LANDESRAT (Budget, Finance and Telecommunications Minister) on behalf of the Government of Styria. A study on the Establishment of a Foreign Direct Investment in the Silicon Alps in the southern State of Carinthia in Austria was completed for the Government of Carinthia. The Vienna Stock Exchange commissioned a Study of Organizational and Financing Practices of Global Stock Exchanges under the auspices of the Chairman and CEO's Office. This "external" study was conducted in conjunction with an "internal" organization study conducted by the Boston Consulting Group (BCG) in the same year 2001-2002. One of the principals was involved with a number of high-tech and medium technology industry and investment studies for the Government of India in the 1970s in the heavy engineering, heavy electricals, electronics and financial sectors including studies for the establishment of R&D Centers, Dry Ports and Industry Logistics and Supply Chain Management Studies.[3]

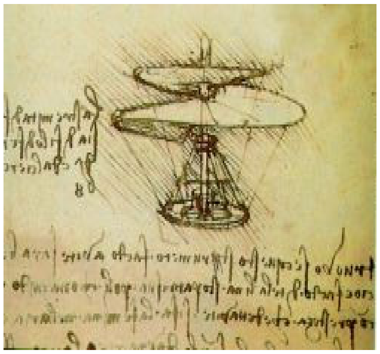
1.3 Sapiens Parque – Knowledge plus Experience

Responsibility for implementation, operation, and management of Sapiens Parque is held by Sapiens Parque S.A, a corporation with privately held capital. The Board of Directors and Executive Board of Sapiens Parque S.A. is comprised of members representing its partners, Companhia de Desenvolvimento do Estado de Santa Catarina ("CODESC" – Santa Catarina Development Company) and The CERTI Foundation[4].

Created by state law in 1975, CODESC assists with the planning and management of economic programs within the State of Santa Catarina. The mission of CODESC is to "stimulate and develop, economically and socially, the Santa Catarina State in accordance with its status and objectives".[1] In partnership with the State of Santa Catarina, CODESC owns the land on which Sapiens Parque is situated.

The CERTI Foundation is a private, non-profit institution headquartered on the campus of Universidade Federal de Santa Catarina (UFSC – Federal University of Santa Catarina) located in Florianopolis.[5] The CERTI Foundation is technology-based and focuses on development of technological innovation, especially segments that "center on the human being and the quality of life"[6] .

The vision and name of Sapiens Parque draws upon *homo sapiens* (human being), suggesting society and experience, and *sapientia* (knowledge), which imparts a connotation of wisdom and education.[1,2] Sapiens Parque is built upon these two primary themes, occupying one major area designated as *Sapiens Scientia*, and another designated *Sapiens Experientia*.



Knowledge

Sapiens Scientia, covering approximately 247 acres (one million m^2), is designed to host organizations and firms from throughout Brazil and the world. With a primary focus on science, technology, R&D, and innovation, Sapiens Scientia will "promote and maintain a dynamic and creative atmosphere capable of influencing the enterprises as well as attracting new talents and competence to the region"[1].

Human

Sapiens Experientia will cover an area of 62 acres (250,000 m^2). As the name implies, Sapiens Experientia will be a place of "experience", stimulating visitors with "museums, show rooms, theme parks, and test/experiment laboratories" [1]. Sapiens Experientia will help bring together other segments of the park and facilitate expansion of the Sapiens Parque trademark as a "national and international reference in innovation, knowledge, quality of life and well being." [1]

The management of Sapiens Parque has three primary objectives for the park[1]:

- To make Sapiens Parque relevant and different by integrating the concepts of knowledge (Sapiens Scientia) and human experience (Sapiens Experientia) into a single innovation park.
- To gain Sapiens Parque, Florianopolis, Santa Catarina, and Brazil world-wide visibility and recognition for innovation and technology.
- To strategically leverage the financial resources and human gifts of Santa Catarina and Brazil to continue development of state and country.

Through realization of these objectives, the management of Sapiens Parque expects to attract a cross section of local, regional and global industries related to[3]:

- High technology
    - Telecommunications
    - Micro-technology & Nanotechnology
    - Computer software and hardware
- Digital entertainment & technology
- Sports technology
- Tourism, trade & investment

The three objectives for the park also drive the management objectives of the GLOBUSTRAT research project as outlined in section 1.4 below.

1.4 Management Objectives of the Study

In order to properly proceed with any research project, it is important to understand the objectives for the investigation outlined by the management of Sapiens Parque. They are as follows[3]:

- **Identify technologies and business sectors to target.**

  In order for Sapiens Parque to become a global magnet for advanced technology, innovation and market-driven business development, management must understand the technologies and business sectors best suited for the park.

- **Benchmark and exceed global best practices.**

  Sapiens Parque management needs visibility to how the world's best parks became so and what those parks do to sustain excellence. Gaining insight into global best practices will assist Sapiens Parque management in reaching and exceeding world-class performance.

- **Confirm endowments to use for competitive advantage.**

  Florianopolis, Santa Catarina State, and Brazil are all rich in certain human, financial, and natural endowments. In order for Sapiens Parque to achieve the status of technology and business leadership, management must be able to utilize and/or develop endowments that will meet the short and long term requirements of the industries the park is targeting.

- **Market demands for growth and sustainability.**

  Sapiens Parque management must be able to confirm existing and identify new market demands that will drive the long term growth and sustainability of the park.

- **Harness cooperation and resources from around the world.**

  In order to gain the financial strength and business potential needed by Sapiens Parque, management must be able to collaborate with world class organizations from around the world. These include technology companies, non-governmental organizations (NGOs), public sector organizations and governmental agencies.

- **Modes and types of financing sources and instruments**

  It is imperative that the growth of Sapiens Parque become self-sustaining and perpetually funding. This necessity drives a requirement to explore and understand all modes of financing available to both Sapiens Parque management and its prospective tenants.

- **Promote and market the park to anchor tenants**

  In order to quickly launch the park successfully, the management of Sapiens Parque wishes to locate and persuade anchor tenants to locate in the park in the 2005-2007 timeframe and to develop a marketing plan for marketing and promotion of the park on an ongoing basis.

The Sapiens Parque Management objectives guide the research objectives of the study as outlined in the next section.

1.5 Research Objectives of the Study

Research objectives are built upon the management objectives. The purpose of research objectives is to clearly convey what must be achieved by the research team. The following research objectives were developed by the GLOBUSTRAT Consulting Group in response to the Sapiens Parque management objectives[3]:

- **Profiles of technology parks.**

  Provide profiles of technology parks by supplying a comprehensive analysis of the size, composition and structure of the technology park industry worldwide. Develop and deliver a global overview of technology parks including their stage of development and their potential growth. Identify current trends, and worldwide similarities and differences among technology parks.

- **Key business sectors to target.**

  Provide a clear understanding regarding the specific key business sectors for Sapiens Parque and the Santa Catarina Government to target, including the product-technology sectors within these key business sectors. Ensure consideration is given to the following:

  - Analysis of the world market potential and development in various sectors such as bio-technology, tourism, education, etc.

  - The existing and probable future endowments available in Florianopolis, Santa Catarina State and Brazil including:
    - Human capital
    - Financial and physical capital
  - Natural resources
  - Cost-benefit of different product-technology segments.
- **Types of firms for establishment and growth.**

  Provide to Sapiens Parque management a clear understanding of the supply chain/distribution/logistics channels necessary to reach the firms that are targeted as potential investors and participants in Sapiens Parque. Provide the aspects pertaining to these three areas that will be critical to the success of Sapiens Parque.

- **Financing options.**

  Recommend financing options to Sapiens Parque management by investigating alternative modes of financing and related best practices. This recommendation will include:

  - Particular focus on government financing of infrastructure, venture capital, angel financing, leasing, equity capital, bank capital and other types of funding sources.
  - Examination of the best practices in technology firm financing and firm exit strategies such as IPO's, acquisitions, mergers, spinouts and corporate venture capital.
  - Suggestion of an appropriate mix of financing options for the Sapiens Parque management to adopt in order to provide short-term, medium-term and long-term funding.

- **Marketing strategy.**

  Recommend a marketing strategy to the management of Sapiens Parque. Provide suggestions for how best to approach/contact target companies and organizations. Include information related to marketing mix (Product, Promotion, Placement and Price).

- **Key success factors for the development of successful technology parks.**

  Based on a comprehensive investigation of the literature and secondary material available, regarding the factors that result in technology park success, and based on a worldwide study of technology park success, identify for Sapiens Parque management the Key Success Factors ("KSFs") that are instrumental in the success of such parks.

- **Optimal park development strategy.**

  Recommend to Sapiens Parque management an optimal development strategy for the creation and growth of a successful technology park. Include in the recommendation such elements as:

  - Models and specific characteristics of technology parks that have succeeded and characteristics of the major technology parks worldwide with regard to:
    - Elements of available services, rivalry, company concentration, proximity to markets and networking.
    - Importance of specialization, innovation, promotion, and management.
    - Involvement by educational institutions and the interdependency among stakeholders.
  - Detailed profiles of key successful technology parks and information on the industries represented in those parks, including:
    - The key traits of the industries present in the parks.
    - The specific role of the government in those parks.
    - The historical evolution of the technology parks and their future prospects.
    - An analysis of the overall attractiveness of the technology parks analyzed.

- **Potential investor firms and participants.**

  Identify the key U.S. and Canadian firms and business/government organizations to target as potential investors and participants in the Sapiens Parque. Include consideration of the targeted business sectors discussed above.

- **Contact information - companies/organizations.**

  Provide the names and addresses of the key contacts in the target firms and organizations. Included in this objective is support on a best-effort basis of facilitating meetings with key-decision makers.

- **Key park officials, authorities, experts worldwide**

  Provide contact information for technology park development officials, local technology park authorities, and technology park experts worldwide.

1.6 Organization of the Research Report

This research report is comprised of ten chapters.

- **Chapter 1** provides an introduction to the study. An overview of Sapiens Parque and its management is included. Also provided are the objectives which drive the research starting with the overarching objectives of Sapiens Parque, continuing with the Sapiens Parque management objectives for this study and concluding with the research objectives developed by the GLOBUSTRAT Consulting Group. Chapter 1 also includes a profile on each of the researchers within the GLOBUSTRAT Consulting Group.
- **Chapter 2** outlines the research methodology that was driven from the research objectives. It provides an overview of the literature and park visits that were used for secondary research, the analytical Global Integrated Technology (GLOINTECH) Park model that was developed by the GLOBUSTRAT team and an explanation of the survey that was used for primary research. Chapter 2 concludes by touching on Findings and Conclusions.
- **Chapter 3** provides a detailed description of the GLOINTECH Park model of key success factors. It describes the background on how the model was developed and an explanation of each of the factors that are used in the model.
- **Chapter 4** provides a general overview of the global technology park industry, highlighting the size of the industry and outlining the major characteristics and findings associated with the industry. This information is considered globally and by geographic regions.

- **Chapter 5** provides insight into findings related to the of tenant companies within technology parks around the world. It discusses types and sources of funds available for firms and considers the forces that encourage financial entities to invest those firms. The chapter closes by examining and comparing the finance industries in North America, Asia, Europe, and South America.
- **Chapter 6** is designed to address two key issues. First, it identifies the factors that are crucial for attracting firms for locating in a technology park. Second, it presents a list of the Key Success Factors (KFSs) based on a quantitative analysis of survey data. A detailed description of the data and the procedures used to analyze the data to derive these results are presented in this chapter.
- **Chapter 7** presents an analysis of the principal modes and models of financing technology parks. It discusses the major strategies used by successful parks and provides insight into financing technology parks and zones. The chapter concludes by identifying the key modes of financing used by the respondents of our technology park manager and park tenant survey.
- **Chapter 8** This chapter deals with marketing strategy for technology parks. Marketing strategy relates to the means of attracting companies to locate in a park. Issues such as promotion of parks to the potential companies, distribution of parks services through intermediaries and positioning a park's value propositions to attract companies and organizations, consistent with the goals of the park are discussed in this chapter.
- **Chapter 9** The chapter outlines the human, financial, and natural resources available to Florianopolis, Santa Catarina State and the country of Brazil. The primary purpose of this chapter is to identify major location related advantages and disadvantages of Sapiens Parque so that the management of the park can build upon its strengths and addresses its limitations.
- **Chapter 10** The final chapter summarizes the major conclusions of this study. Based upon these conclusions, the research team has outlined a series of strategic and tactical recommendations for the management for the successful growth of the Sapiens Parque.

1.7 Profile of the Research Team

The GLOBUSTRAT Consulting Group is comprised of 14 middle and senior managers holding positions with firms throughout California's Silicon Valley and San Francisco Bay area. With educational backgrounds from prestigious universities throughout the world, the GLOBUSTRAT team has accumulated more than 200 years of business experience across a broad spectrum of disciplines.

The researchers were segregated into three teams, each with an area of focus:

The Americas Team

From left to right:
Mr. Piyush Mittal
Mr. Hussein Mukaled
Mr. Harish Arora
Mr. Travis Cox, CPIM

Piyush Mittal is founder and CEO of management consulting firm ROI IT, Inc., specializing in aligning the IT strategies of organizations with their business strategies, with particular focus on defining and measuring ROI. He has over 15 years of experience in the professional consulting services industry, with engagements ranging from Six Sigma based BPR at Cisco Systems to streamlining financial reporting and forecasting at DaimlerChrysler and Sun Microsystems. He has partnered with Unisys SynerCom Asia in providing systems integration services for MashreqBank in Dubai and TSB Bank in Ireland, and assisted the states of Oklahoma and West Virginia in developing systems to streamline Child Protection Services and Environmental Violations Tracking respectively. Piyush Mittal holds a Bachelor of Science degree in Electronics Engineering from the University of Mumbai, India.

Hussein Mukaled is a Vice President of Business Planning and Operations for Nikon Precision, Inc. , a subsidiary of Nikon Corporation and a leader in advance lithography equipment and consumer products. He has extensive experience in North American, Asian and European markets promoting business with leading semiconductor manufacturers. Mr. Mukaled has a

Bachelor of Science in Electrical Engineering and Electronics from Arizona State University in Tempe, AZ.

Harish Arora has more than 16 years of experience in the full life cycle of business systems software consulting. He is currently Senior Solutions Specialist/Architect for Sun Microsystems, Santa Clara, CA, where he is responsible for the overall design and technical oversight of complex business initiatives in customer consulting engagements. Prior to Sun Microsystems, he held positions as Systems Engineer and Area Manager for ACXIOM Corporation and Digital Equipment Corporation in Delhi, India respectively. Mr. Arora holds a Bachelor of Engineering in Computer Science from Amravati University, India and is a Sun Cluster and Digital Unix certified professional.

Travis Cox, CPIM is the Principal Consultant for and the founder of ParaKletos Consulting Group, LLC. He has over two decades of experience helping domestic and global corporations implement complex enterprise software solutions. Travis Cox holds an A.A. in Accounting from Richland College, Dallas, Texas and a B.S.B.A. from the University of Texas, Dallas. He is Certified in Production and Inventory Management (CPIM) by APICS, the Association for Operations Management.

The Rest of the World Team

From left to right:
Mr. Mohan Kanthappan
Mr. Hamid Marshall
Mr. Camilo Pascua, CFM
Mr. Stephen Johnston
Mr. Frank Lucero

Mohan Kanthappan is currently working with Franklin Templeton as Manager, Business Intelligence he is also a founder and Vice President of Operations of Celer Services LLC, a healthcare services outsourcing company in Houston, TX and Bangalore, India. Previously, he was Manager of IT at 3Com Corporation in San Jose, CA where he led the technical architecture team and repository support. Other work experience includes Project Manager for Banca Sella in

Italy, Project Manager for Sella Synergy, Ltd in India and Project Leader for the Bank of Thailand in Bangkok, Thailand. Mr. Kanthappan earned a Bachelor of Commerce degree from the University of Madras and a Post Graduate Diploma in Computer Science & EDP Management from the Bureau of Data Processing Systems, Ltd in Bombay, India.

Hamid Marshall has 16 years of hi-tech work experience. As Staff Engineer for Netgear, Inc, Mr. Marshall leads the development of industry standard compliant high-speed wireless routers. He works with hardware and RF teams to develop the system architecture, software and engineering specifications and he developed the test plan and interoperability specifications for the WPA security standard for Netgear wireless routers. Prior to Netgear, Inc, Mr. Marshall was Software Development Manager for Cyberwatch Security Communication Technology, Inc and Software Manager for 3COM, Inc. in Silicon Valley. He was awarded a B.S. degree in Electrical Engineering with a minor in Economics and an M.S. degree in Electrical Engineering from the University of California, Los Angeles.

Camilo Pascua is employed by Genentech, Inc. in South San Francisco as Facilities Project Manager. He collaborates with engineering on construction projects from the design phase through commissioning and has established quality and performance standards for buildings and facility systems. His previous position was at Pfizer as a Facilities Planning Manager where he managed the design and construction of a 68,000 sq. ft. three-story R&D building. Other positions include Senior Facilities Engineer at Lam Research Corporation and Architectural Project Manager at WHL Architects * Planners, Inc. Camilo Pascua was awarded a Bachelor of Architecture from the California Polytechnic State University, San Luis Obispo, CA and has a certification from California State University, Hayward in Facilities Management.

Stephen Johnston is currently a Senior Software Localization Engineer at Yahoo!, Inc. (Sunnyvale, CA). He manages localization engineering as part of the Yahoo's global expansion program, with the goal of gaining the largest market share for the flagship Yahoo! Mail/PIM products in new Asian and European markets. Mr. Johnston has held senior engineering management positions at other top Silicon Valley companies including PayPal, Inc. (San Jose, CA), Lionbridge Technologies (San Francisco, CA), and SimulTrans LLC (Mountain View, CA). Mr. Johnston is originally from the United Kingdom and has also lived and worked in Ireland, France and Japan for top multinational companies. Mr. Johnston holds a B.Sc. (honors) in

Computer Science from The Queen's University of Belfast, Northern Ireland, and did graduate work in the Artificial Intelligence (Robotics) in the M.Sc. program at the University of Edinburgh, Scotland.

Frank Lucero is Director of Finance for NeoPath Networks, in Santa Clara, CA. Prior to joining NeoPath, Mr. Lucero was Senior Strategic Finance Analyst for Intel Corporation where he drove the strategic planning and investment process for the Software & Solutions Group. His analysis led to over $20M in cash recovery for Intel. He also served as Optics Manufacturing Plant Analyst (in the Intel Optical Platform Division) where he drove financial planning & analysis for manufacturing operations. He also developed & implemented key business metric programs responsible for driving cost reductions in materials and manufacturing. His strategic analysis led to over $9M in cash savings for Intel's offshore manufacturing strategy. He also led Finance & HR integration activities for two highly successful high-tech startup companies. Some of Mr. Lucero's past positions include Assistant Controller, LightLogic, Inc.; Accounting Manager, Clarify Software, Inc; and Senior Staff Accountant, Ernst & Young, LLP. He received a Bachelor of Science degree in Business Administration from the California State University, Hayward.

The Capital Funding Team

From left to right:

Mr. Bennett Gutmann

Mr. Michael Elkin

Dr. Christina Chan

Mr. Kalyana Sundaram

Mr. Eric Allegakoen, CPA

Bennett Gutmann is a Senior Manager with Solectron Corporations Global Program Management team. Mr. Gutmann is responsible for the management of customer accounts across all geographies and services that Solectron provides. Mr. Gutmann has over 10 years of experience in global contract manufacturing in both project lead and operational management. Previous to Solectron, Mr. Gutmann Worked for Celestica, as the New Product Introduction Manager, launching over $300 million dollars of products a year into volume manufacturing. Mr.

Gutmann has also been a Program Manager for InnerStep, BSE in San Jose, CA and Account Executive for Future Electronics, FAI, also in San Jose, CA. He graduated with a Bachelor of Arts in History with a minor in Modern Literature from the University of California, Santa Cruz.

Michael Elkin is an independent consultant for the International Labour Organization's (United Nations) Start and Improve Your Business Project program and Assistant District Director of Entrepreneurial Development for the San Francisco District U.S. Small Business Administration in San Francisco, CA. He directs a private-public sector entrepreneur center and delivers management training, counseling and financial services to northern California small businesses. Previously, he was Manager at the SBA's One-Stop Capital Shop in Oakland, CA and California SBDC Project Officer at the SBA. He has also served as the SBA's Regional International Trade Officer. He served as a U.S. Peace Corps volunteer in Nairobi, Kenya and implemented IYB techniques for management process improvement for over 30 small businesses while there. He has also been a Retail Manager at Don's Toys in Rolling Hills Estate, CA. He earned a B.A in Economics and B.S. in Business Administration from San Francisco State University.

Christina Chan is Director of DSP Firmware at Ditech Communications, Mountain View, CA. With over 12 years of engineering experience, she is responsible for leading a team of engineers in the development and implementation of next generation VoIP products. Dr. Chan was Director of Engineering at Valence Semiconductors, Inc. in Irvine, CA prior to Ditech Communications and Manager of IAD Development at Accelerated Networks Inc., Moor Park, CA before that. Dr. Chan holds a B.S. degree in Electrical Engineering from the University of California, Berkeley and an M.S. and Ph.D. in Electrical Engineering from the University of California, Santa Barbara.

Kalyana Sundaram is a Solutions Architect at Cisco Systems, Inc. in San Jose, CA. He collaborates with users to implement process change that improves sales credit automation and presents the changes and feedback to top IT management. Other positions he has held at Cisco include IT Project Manager, IT Engineer and Software Engineer. Before joining CISCO, he was a Software Engineer at Infoserv Systems in Fremont, CA and with Square D Software Ltd. in Chennai, India where he did projects for Oracle, Singapore as Lead Analyst and Programmer/Analyst. He has also worked in Australia, India, Malaysia and Abu Dhabi. Mr. Sundaram was awarded a Bachelor of Science degree in Mathematics and a Masters of Science degree in Mathematics from the University of Madras, India.

Eric Allegakoen is Senior Finance Director and Chief Audit Executive of Adobe Systems Incorporated in San Jose, CA. He has over 15 years of global experience in Auditing and Assurance Services including Enterprise Risk Management. He reports to the Chief Financial Officer and to the Audit Committee of the Board of Directors of Adobe and is responsible for planning, developing and executing corporate-wide, risk-based audit plans and on-going internal risk assessment programs. Mr. Allegakoen is a member of Adobe's Disclosure Committee which reviews all SEC filings and is also a member of the Integration Task Force. As part of this role, Mr. Allegakoen was involved with Adobe's recent $3.4 Billion strategic acquisition and integration of Macromedia Inc into Adobe Systems. Mr. Allegakoen also heads Adobe's global Sarbanes-Oxley (SOX) compliance efforts and is considered an expert in the area of SOX Compliance. He is a member of the National SOX Committee of the American Electronics Association (AeA) in Washington, DC. Other professional activities include being a member of the Editorial Committee of the "Internal Auditor" magazine, a global publication of the Institute of Internal Auditors; Immediate Past President and Board Member of the Institute of Internal Auditors' Silicon Valley Chapter. Past work experience includes Ernst & Young LLP, USA as Senior Manager in the Technology, Communications and Entertainment practice area; PricewaterhouseCoopers (Singapore), as Audit Manager in the High Tech Industry practice area; Westpac Banking Corporation, (Sydney, Australia) as Corporate Internal Audit Manager; and Deloitte & Touche, (Sydney, Australia) as Senior Auditor. Mr.. Allegakoen holds a Bachelor of Commerce degree from the University of Newcastle, Australia majoring in Accounting. Mr. Allegakoen holds the following professional memberships and certifications: Certified Public Accountant (CPA), licensed in the State of California, Fellow of the Institute of Chartered Accountants of Australia (FCA), Certified Practicing Accountant of the Australian Society of CPA's (CPA); Certified Internal Auditor, (CIA) and Certification in Controls Self Assessment (CCSA).

1.8 Summary

This chapter has introduced the study of Global Best Practices and Key Success Factors of Science and Technology Parks conducted by the 14-member, three-team GLOBUSTRAT Consulting Group of California State University, East Bay's TEMBA program. The study is conducted for the government of Santa Catarina State, Brazil, and, specifically, Sapiens Parque S.A.. The chapter provides an overview of Sapiens Parque, an innovation park, located in the capital of Santa Catarina, Florianopolis. The chapter also sets the stage for the remaining report by outlining the management and research objectives of the study and summarizing each chapter of the report. The chapter concludes with professional and educational profiles of each of the members of the research team.

Chapter 2 will build upon the management and research objectives outlined in this chapter. It will explain the research methodology used for the research project.

1.9 Sources – Chapter 1

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[3] Global Business Strategic Consulting (GLOBUSTRAT) Program Outline Proposal for Sapiens Parque, Florianopolis, JUNE 10, 2005.

[4] Sapiens Parque PowerPoint Overview, retrieved February 22, 2006 from http://www.sapiensparque.com.br/sapiens/default.aspx

[5] The Communication Initiative, Programme Experiences, Sapiens Circus - Brazil, retrieved February 22, 2006 from http://www.comminit.com/experiences/pdskdv102003/experiences-903.html

[6] Brazil and U.S. Technology Open House, NIST, Gaithersburg, MD, 30th June 2004, retrieved February 22, 2006 from http://www.nist.gov/oiaa/participant.pdf

Chapter

2

2.0 Research Methodology

2.1 Overview

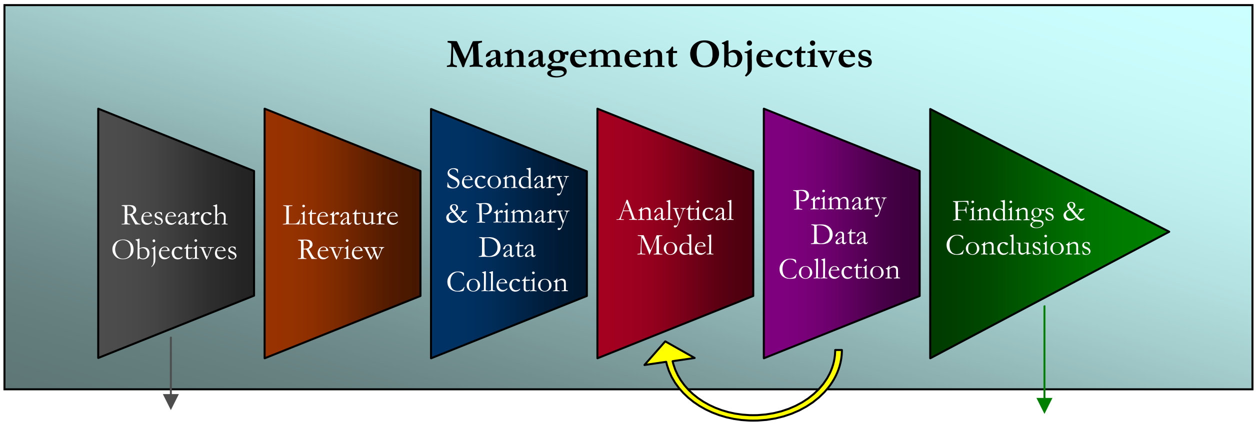
Science and research parks are increasingly viewed as being viable tools for stimulating regional economic development. There exists extensive literature and information from various secondary sources on the topics of technology clusters and research parks. The rapidly changing business climate and increased pace of globalization has meant that studies of this nature have a short 'shelf life'. This project sought to combine the vast body of available knowledge with sound primary research to arrive at findings that answered the questions posed by Sapiens Parque management.

In this chapter, we describe the research methodology we followed to achieve the objectives of this study. First, we describe the research design we used for the purpose of collecting and analyzing the data to address the issues identified in each research objective we presented in the previous chapter. The research design required both secondary data and primary data. This chapter provides a detailed description of the sources of both these types of data. We also used various analytical tools which are described under the methods of data analysis. Finally, we present the limitations of the study. The chapter concludes with an overall summary.

2.2 Research Design

We followed the descriptive design in this study whereby we conduct both quantitative and qualitative analysis of data collected from a variety of primary and secondary sources. The approach we followed to execute this research study is depicted in Figure 2-1.

Figure 2-1 Research approach followed in this study

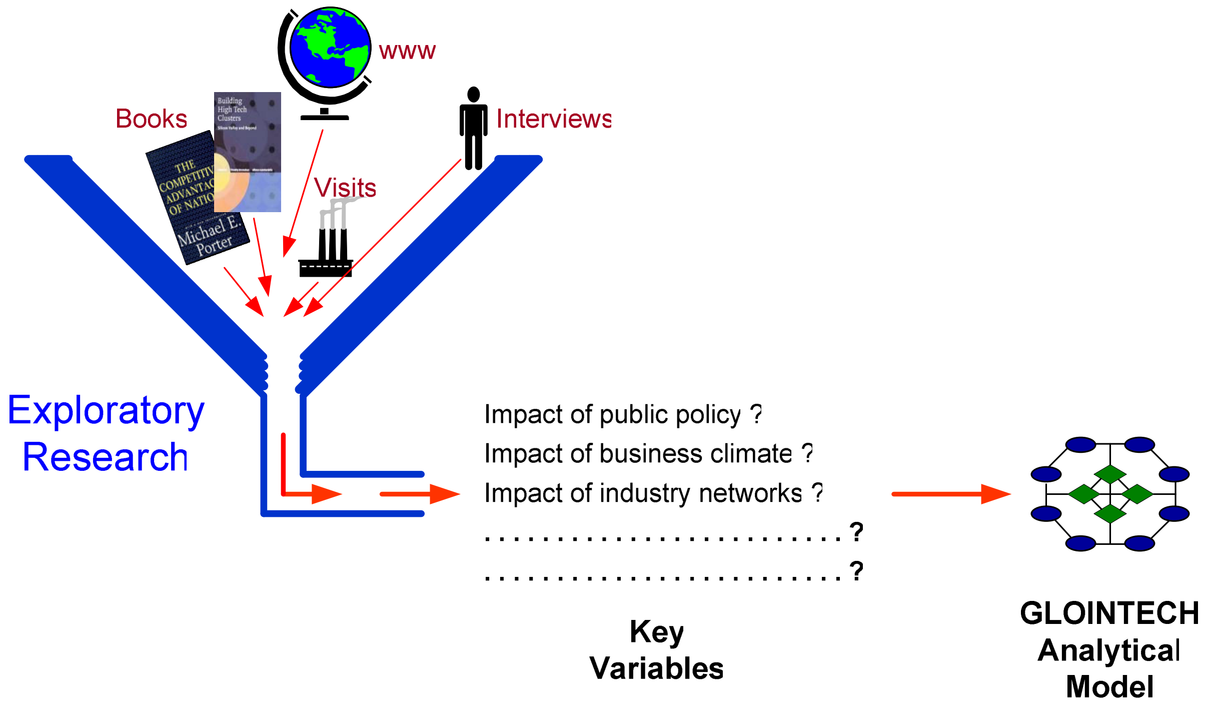


As the figure shows, this research study was driven by the management objectives of Sapiens Parque management, which were used to define the framework of the overall project. The management objectives that motivated the commissioning of this project were presented in Chapter 1. The management objectives also helped to define and refine the research objectives that we presented in Chapter 1.

Having the knowledge of the management objectives and after defining the objectives of this research, we conducted an extensive review of the extant literature on technology parks. The literature we reviewed included both printed and electronic media. More on the sources we consulted is presented in Section 2.3.1. Our preliminary research of literature was complemented by the collection of primary data obtained from interviews of experts and field visits to technology parks. Details on interviews and field visits appear in Sections 2.3.2. The knowledge acquired from literature review, interviews of practitioners in the field and visits to several technology parks in the Bay Area, California and abroad (Thailand, Taiwan etc.) formed the basis for the analytical model we developed to help identify the factors that might impact technology park performance. Figure 2-2 shows the process of developing the analytical model of Key Success Factors.

The research team examined several models that already exist and are used to study industrial clusters. These included Marshall's Cluster Model, Dunning's Eclectic Model, and Porter's Four Diamond Model. Our exploratory research identified several variables that had been virtually ignored by these existing models. To ensure that none of the variables were ignored, we developed our own conceptual model that included important factors that we believed influence the success of technology parks. Details of our analysis of existing models, the variables they were missing, and the Global Integrated Technology ("GLOINTECH") Park model we developed, are explained in the next chapter.

Figure 2-2 Overview of developing the GLOINTECH analytical model



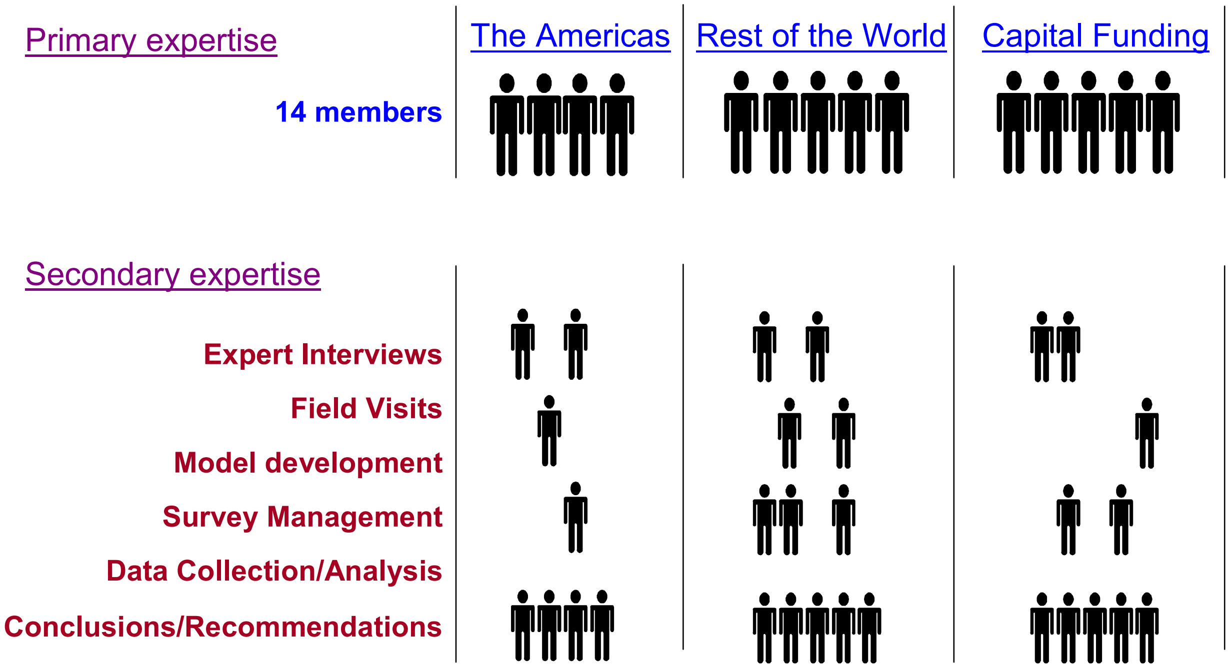
After developing the analytical model, we designed two surveys: one for managers of technological parks worldwide and the other for the tenants located in those parks. These surveys provided us with the primary data needed to examine the significance of the factors identified in the theoretical model in explaining the relative success of the parks surveyed. Details on data collection through these two surveys are presented in Section 2.3.2.3. We present the complete details regarding the empirical test of our model in Chapter 6.

Apart from empirically testing the analytical model, we also present details regarding the worldwide technology park industry. We also analyze the financing practices of parks and tenants in parks by using both secondary and primary data. In addition, we also present the marketing practices of technology parks. The analyses of various aspects of technology parks are presented in subsequent chapters as described in Section 1.6 of the previous Chapter 1.

In order to accomplish these different tasks successfully, it was very important that the research team of 14 TEMBA participants were organized properly. Information sharing and knowledge management were identified as being crucial to this project considering its large scale and aggressive schedule. The team worked in a matrix organization to ensure smooth knowledge acquisition, dissemination, analysis and consolidation.

The organizational structure for executing the project is presented in Figure 2-3.

Figure 2-3 Organizational structure of research team



Each team member had a primary area of expertise. In addition, team members performed detailed research on specific parks and clusters from the geographical region assigned to them. Sub-teams comprising of members from each team were formed during each stage of the project to coordinate and contribute towards achieving the research objectives. Regular meetings and the use of online collaboration tools ensured close coordination and knowledge sharing.

2.3 Data Sources

As outlined in Section 1.5 of Chapter 1, this research study was guided by a number of research objectives that required a large amount of data. The research design described in the previous section provides additional insight into the various tasks the team performed to achieve the objectives of this study; these included collecting data from various sources.

There were two main types of data sources used for this study: Secondary and Primary sources. A description of the nature and sources of data follows.

2.3.1 Sources of Secondary Data

Secondary data is defined as being data that has already been collected by someone else. For example, reading a book or acquiring data from online sources are deemed secondary data since the researcher is not "creating" any data from these sources other than simply acquiring it from them. Secondary data is necessary for both exploratory research conducted during the early stages of a research project, and for conclusive research targeted at answering specific research questions or testing research hypotheses.

The broad scope and global nature of the research objectives necessitated the use of exploratory research to gain additional insights before an approach could be developed. An extensive literature review formed a large component of the exploratory research and contributed significantly to our understanding of the technology park industry and the identification of key variables associated with it. The secondary data for this research was sourced from a review of the vast body of knowledge available in the form of books, research studies, university databases, trade publications and the internet. The review covered a wide range of topics pertinent to the management objectives and focused on a number of factors such as economic development and the competitiveness of countries, technology clusters and parks, financing of clusters and parks, marketing of parks and a number of other issues. In this section, we present a list of some of the different secondary sources we used for this study.

2.3.1.1 List of Books

- Timothy Bresnahan and Alfonso Gambardella (2004), *Building High-Tech Clusters: Silicon Valley and Beyond*. Cambridge University Press.

- Johannes Brocker, Dirk Dohse and Rudiger Soltwedel (2003), *Innovation Clusters and Interregional Competition*. Springer-Verlag.

- M. Castells and P. Hall (1994), *Technopoles of the World: The Making of 21st Century Industrial Complexes.* Routledge.
- Gordon L. Clark, Maryanne Feldman and Marc S. Gertler (2000), *Oxford Book of Economic Geography*. Oxford University Press.
- Michael Enright, Edith Scott and David Dodwell (1997), *The Hong Kong Advantage*. Oxford University Press
- Paul Gompers and Josh Lerner (1999), *The Venture Capital Cycle*. MIT Press.
- Paul Gompers and Josh Lerner (2001), *The Money of Invention: How Venture Capital Creates New Wealth*. Harvard Business School Press.
- Michael I. Luger and Harvey A. Goldstein (1991), *Technology in the Garden: Research Parks and Regional Economic Development.* University of North Carolina Press.
- Mehroo Jussawala and Richard Taylor (2003), *Information Technology Parks of the Asia Pacific: Lessons of the Regional Digital Divide*. M.E. Sharpe.
- Martin Kenney (2000), *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*. Stanford University Press.
- Nikolaus Komninos (2002), *Intelligent Cities: Innovation, Knowledge Systems and Digital Spaces*. Spon Press.
- Paul Krugman (1993), *Geography and Trade*. MIT Press,
- Paul Krugman (1993), *Development, Geography and Economic Theory*. MIT Press,
- Chong-Moon Lee, William F. Miller et al (2000), *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*. Stanford University Press
- Alfred Marshall (1997), *Principles of Economics*. Prometheus Books.
- David G. McKendrick, Richard E. Donner and Stephan Haggard (2000), *From Silicon Valley to Singapore: Location and Competitive Advantage in the hard Disk Drive Industry*. Stanford University Press.

- Malcolm Parry and Peter Russell (2000), *The Planning, Development and Operation of Science Parks*. U.K. Science park Association.
- Michael Porter (1990), *The Competitive Advantage of Nations*. Free Press.
- Michael Porter (1996), *On Competition*. Harvard Business School Press.
- John Rees (1986), *Technology, Regions and Policy*. Rowman and Littlefield.
- AnnaLee Saxenian (1994), *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press.
- Allen Scott (2001), *Global City-Regions: Trends, Theory, Policy*. Oxford University Press..
- David Rosenberg (2002), Cloning Silicon Valley: The Next Generation High-tech Spots. Reuters

2.3.1.2 Other References

- The State of Connecticut: Strategy for Economic Development, *Harvard Business School Case 9-703-426*
- Building a Cluster: Electronics and Information Technology in Costa Rica, *Harvard Business School Case 9-703-422*
- National Innovation Systems and Comparative Industry Evolution, *Harvard Business School Case 9-601-049*
- TEMBA Program 2001-2002 Project Report, *Cluster Consulting Group*
- Fundacion Chile: Creating Innovative Enterprises, *Babson Case BAB089*
- The Advent of Venture Capital in Latin America, *Harvard Business School Case 9-797-077*
- Silicon Valley North: The Formation of the Ottawa Innovation Cluster, *ITAC October 2002*
- 1-800-Buy Ireland, *Harvard Business School Case 9-298-001*
- Venture Capital in Ireland: Getting their ACT Together, *Harvard Business School Case 9-298-001*

- The Indian Software Industry in 2002, *Harvard Business School Case 9-700-036*
- A Silicon Valley of the East: Creating Taiwan's Semiconductor Industry, *John Mathews, California Management Review, Summer 1997*
- Singapore Inc, *Harvard Business School Case 9-703-040*
- A Note on Government Sources of Financing for Small Businesses, *Harvard Business School Note 9-298-015*
- How Venture Capital Works, *Harvard Business Review Reprint 98611*
- Making Sense of Corporate Venture Capital, *Harvard Business Review Reprint R0203G*
- Benchmark Capital in Europe, Sarajevo Graduate School of Business
- Chrysalis Venture Capital: Venture Capital in an Emerging Market, *Harvard Business School Case 9-702-005*
- Gobi Partners: October 2004, *Harvard Business School Case 9-805-090*
- The Advent Israel Venture Capital Program, *Harvard Business School Case 9-298-072*

2.3.1.3 Internet Resources

▪ CIA – The World FactBook	http://www.cia.gov/cia/publications/factbook/
▪ The World Bank Report	http://econ.worldbank..org/wdr
▪ IMF Finance and Development	http://www.imf.org/external/pubs/ft/fandd/index.htm
▪ STAT-USA	http://www.stat-usa.gov/
▪ STATCAN	http://www.statcan.ca/
▪ Human Development Reports	http://hdr.undp.org/
▪ The Heritage Foundation	http://www.heritage.org/
▪ The Fraser Institute	http://www.fraserinstitute.ca/

U.S. Department of State	http://www.state.gov/
Transparency International	http://www.transparency.org/
OECD	http://www.oecd.org/home/
EUROPA Eurostat	http://europa.eu.int/comm/eurostat/
Milken Institute	http://www.milkeninstitute.org/

2.3.1.4 Journals

Harvard Business Review	http://www.harvardbusinessonline.org/
Sloan Management Review	http://sloanreview.mit.edu/
California Management Review	http://cmr.berkeley.edu/
Business Horizons	
The Economic Journal	
Journal of Political Economy	http://www.journals.uchicago.edu/JPE/home.html

2.3.1.5 Technology Parks researched in depth

Through the review of secondary data from a variety of sources, we collected a significant amount of data related to different parks located all over the world. We especially focused on the parks listed below for detailed study.

2.3.1.5.1 Parks Located in the Americas

Costa Rica Cluster, Costa Rica	http://www.cinde.org
Virginia BioTechnology Research Park, USA	http://www.vabiotech.com/
Technoparc Saint-Laurent, Canada	http://www.technoparc.com/
University of Arizona, USA	http://www.uatechpark.org/
Innovation Park, USA	http://www.innovation-park.com

- Los Alamos Research Park, USA http://www.la-rp.org/
- Stanford Research Park, USA
  http://www.stanford.edu/home/welcome/research/researchpark.html
- Research Triangle Park, USA http://www.rtp.org/
- Monterey Bay Science Park, USA

2.3.1.5.2 Parks Located in Europe and Middle East

- Heidelberg Technology Park, Germany http://www.technologiepark-hd.de/
- Adlershof Technology Park, Germany http://www.adlershof.de/index.php?id=wista-home&L=14
- Silicon Wadi, Israel
- Alba Technology Center, Lothian http://www.albacentre.com/
- Cambridge Science Park http://www.cambridge-science-park.com/
- Sheffield Technology Parks http://www.shefftechparks.com/
- Edinburgh Technopole http://www.edinburghtechnopole.co.uk/
- Sophia Antipolis, France http://www.sophia-antipolis.org/
- National Technology Park, Limerick http://www.shannon-dev.ie/ntp/
- National Digital Park, Dublin http://www.citywest.com/ndp.asp

2.3.1.5.3 Parks Located in Oceania (Asia, Australia and New Zealand)

- HsinChu Science Park, Taiwan http://eweb.sipa.gov.tw/en/index.jsp
- Zhongguancun Science Park, China
  http://www.zgc.gov.cn/cms/template/index_english.html
- Kyoto Research Park, Japan http://www.krp.co.jp/english/index.html

- Malaysia Multimedia Super Corridor, Malaysia http://www.mdc.com.my/
- Australian Technology Park, Australia http://www.atp.com.au/
- Brisbane Technology Park, Australia http://www.brisbanetechnologypark.com.au/
- Singapore Science Park http://www.sciencepark.com.sg/
- Hong Kong Science and Technology Parks http://www.hkstp.org/
- Bangalore Software Technology Park, India http://www.blr.stpi.in/index.htm
- High Tech City Hyderabad, India

2.3.1.5 Secondary Surveys

- UKSPA Survey of Best Practices for Incubators and science Parks (1998)
- UKSPA Evaluation of Past and Future Economic Contribution of Technology Parks Survey (2003)
- Chinese Technology Park Survey (2001)
- ANPROTEC Panorama Surveys of Brazilian Incubators and Technology Parks (2001-2005 Annual)
- TEMBA Survey of Global Clusters (2001)
- Clusters of Innovation: Regional Foundations of U.S. Competitiveness Reports/Surveys (2005)
- Silicon Valley Joint Venture Index (2000-2005 Annual)

2.3.2 Sources of Primary Data

In addition to a variety of secondary sources, we collected relevant data from primary sources. Primary data is defined as data that is "created" by the researcher. For example, any data obtained by means of an interview, observation or survey is primary data since the researcher "creates" it rather than simply acquiring pre-existing data. We used a number of sources to collect primary data. Their description follows.

2.3.2.1 Interviews of Experts

We conducted a number of personal and telephone interviews of several experts worldwide in order to gain their insights regarding the important issues in managing technology parks and the KSFs of such parks. These experts had various backgrounds and had a great deal of experience working in technology parks in various capacities. Their names, designation and addresses are listed below:

Ms. Nicole M. Colomb
Business Development and Communications Coordinator
Virginia BioTechnology Research Park
800 E. Leigh Str.
Richmond, VA 23219
USA

Mr. Chuck Erickson
Managing Director, San Jose Software Business Cluster
2 North First Street, Fourth Floor
San Jose, CA 95113
USA

Ms. Jennifer Ferris
Director, Communications
The Research Triangle Foundation of North Carolina
2 Hanes Drive, P.O. Box 12255
RTP, NC 27709
USA

Mr. Hector Gonzalez
Promotion, CINDE Costa Rica
Plaza Roble, Edificio Los Balcones, 4th Floor
Guachipelin, Ezcazú
Costa Rica

Mrs. Theresa Mathawaphan
Marketing Coordinator, Thailand Science Park
131 Thailand Science Park
Paholyothin Rd., Klong 1,
Klong Luang, Pathumthani 12120
Thailand

Mr. James Paxson
General Manager, Hacienda Business Park
4473 Willow Road
Pleasanton, CA 94588
USA

Ms. Cara Rousseau
Director, Research and Information
The Research Triangle Foundation of North Carolina
2 Hanes Drive, P.O. Box 12255
RTP, NC 27709
USA

Mr. Desmond Ryan
Qatar Science and Technology Park
Qatar Foundation
Doha, Qatar

Mr. Ramsey Shuayto
Asset Manager, Stanford Management Company
2770 Sand Hill Road
Menlo Park, CA 94025
USA

Ms. Jean Snider
Managing Director, Stanford Management Company
2770 Sand Hill Road
Menlo Park, CA 94025
USA

Mr. Patrick Sullivan
Director, Los Alamos Small Business Development Center
University of New Mexico – Los Alamos
190 Central Park Square
Los Alamos, NM 87544
USA

2.3.2.2 Field Visits

In addition to interviewing experts, we also wanted to gain first hand knowledge about parks by actually visiting them. Such visits provided with opportunities to see for ourselves how parks work and how they are managed. The parks we visited are listed below.

Stanford Management Company

2770 Sand Hill Road

Menlo Park, CA 94025

USA

San Jose Software Business Cluster

2 North First Street, Fourth Floor

San Jose, CA 95113

USA

Thailand Science Park

131 Thailand Science Park

Paholyothin Rd., Klong 1,

Klong Luang, Pathumthani 12120

Thailand

Hacienda Business Park

4473 Willow Road

Pleasanton, CA 94588

USA

2.3.2.3 Surveys of Technology Park Managers and Tenants

In addition to interviews of experts and personal visits to technology parks, one of the most important sources of data for this study was the survey of park management and tenants all over the world. It was especially necessary for us to get the opinions of park managers and tenants as "experts" regarding success factors, financing practices, marketing practices and the relative importance of a variety of sub-factors associated with our 12-factor analytical model. Our surveys of both the park managers and tenants of parks turned out to be a major source of data for the purpose of empirically testing our analytical model. In this section, we describe the process of collecting survey data we used in this study.

2.3.2.3.1 Questionnaire Design

The research objectives outlined in the previous chapter formed the foundation of the survey design. Based on those research objectives, we first identified the data needed to empirically examine our conceptual model and address issues related to financing and the marketing of parks. We also needed detailed data on the relative importance of various elements associated with the major factors of the model. We had to keep several things in mind when designing these surveys:

- Given that we intended to survey managers and park tenants all over the world, we needed to make sure that the language of the survey be kept as simple as possible.

- We intended to use the on-line method (Internet) of collecting data by using services of one of the online survey companies. This required that the design of the survey be kept simple.

- Given the nature of the respondents who tend to be quite busy people, we wanted to keep both the questionnaires focused to the absolute minimum data that we needed.

Keeping these considerations in mind, we designed two surveys: one for managers of technology parks and the other for tenants of such parks. Fortunately, one of the previous cohorts of the TEMBA program had conducted a study on the Global Best Practices for the establishment of a high-tech business cluster in the province of Styria, Austria. We used that survey as the starting point for designing our surveys. After several iterations of improving the two surveys, we prepared the final drafts of both. Before finalizing them, we conducted a pilot test of the surveys to make sure that there was no major problem associated with the surveys. After addressing the issues detected in the pilot surveys, we again finalized both surveys. Copies of these two surveys are presented in Appendix A (Management survey) and Appendix B (Tenant survey).

2.3.2.3.2 Administering the Surveys

The Internet-based survey was hosted on the popular Zoomerang web site. The initial email to each potential respondent requesting their participation was followed up by a phone call from a research team member encouraging their participation. This methodology resulted in a quick turnaround between the first contact with a respondent and receipt of their completed survey.

Survey results were available to the research team as soon as they were submitted by respondents. The Zoomerang web site allows the viewing of individual or consolidated survey results with simple reporting, crosstabs and downloads.

2.3.2.3.3 Sampling Design

We wanted to survey management and tenants of parks located in the Americas, Asia, Europe and Oceania. Therefore, the target population was geographically stratified into three regions: The Americas (North and South), Europe and Asia and Oceania (Australia, New Zealand). The technology parks and tenants were selected from each strata. This required identifying the addresses of technology parks located in these areas and getting the e-mail addresses of the managers of those parks, a challenging task.

The sampling frame or the list of e-mails for sampling consisted of identifying the target population from publicly available sources like the web sites of the International Association of Science Parks ("IASP") and the Association of University Research Parks ("AURP"). Our initial list consisted of 816 email addresses for park managers and 964 email addresses for park tenants, all obtained from the web-sites of IASP, AURP and tech parks. We also sent e-mails to several individuals we knew in different countries requesting their help in getting managers and tenants of parks in their respective countries to help us complete the surveys. Web based tools used to crawl through tech park and other web sites to procure email addresses were used to supplement the original e-mail effort and over 48,000 emails were sent out all over the world

Surveys were sent out starting in late November 2005. The email campaign was followed up by telephone calls to park managers and tenants soliciting their response to the survey. After several e-mails and phone calls, we received responses from 123 park managers and 54 tenants. Details regarding their profiles are presented in the next section

2.3.2.3.4 Profile of Samples

In this section, we present the major profiles of the parks represented by the survey respondents from both management and tenants groups. As mentioned earlier, we received a total of 123 and 54 responses from park managers and tenants respectively.

Table 2-1 lists the names of the countries represented by both the managers and tenants. We received surveys from managers representing 29 different countries whereas the tenants represented 16 different countries. Almost one-half of the surveys were completed by personnel in the U.S.

Table 2-1 Countries Represented by Management and Tenant Respondents

Countries	Management	Tenants
USA	52.8%	46.3%
Canada	4.9%	3.7%
Scotland	4.1%	
England	3.3%	9.3%
Germany	2.4%	
New Zealand	2.4%	
Ireland	2.4%	5.6%
Malaysia	2.4%	1.9%
Finland	1.6%	
Mongolia	1.6%	
Costa Rica	0.8%	
Spain	0.8%	
Iran	0.8%	
Mexico	0.8%	
Qatar	0.8%	
Austria	0.8%	1.9%
Japan	0.8%	
Jordan	0.8%	
United Arab Emeritus	0.8%	
France	0.8%	1.9%
Taiwan		3.7%
Hong Kong		3.7%
Singapore	0.8%	3.7%
India	0.8%	5.6%
Russia	0.8%	
Australia	0.8%	
Finland	0.8%	
Thailand	0.8%	
Uruguay	0.8%	
Republic of China	0.8%	1.9%
Demark	0.8%	1.9%
Slovenia		1.9%
Turkey		1.9%
Sweden		1.9%
Unidentified	6.5%	3.7%
Total	123 (100%)	54 (100%)

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

Table 2-2 presents the profiles of parks based on their major focus in terms of business area/discipline. As the figure shows, the major focus of the parks represented was R&D (56% for management and 41% for tenants) followed by Engineering/Technology (11% for management and 19% for tenants). Altogether, these two groups of respondents represented technology parks which ranged across almost 20 different areas.

Table 2-2 Management and Tenant Respondents: Focus of Parks

Focus of Parks	Management	Tenants
R&D	56.1%	40.7%
Engineering/Technical services	11.3%	18.5%
Corporate office center	6.5%	
Manufacturing/Assembly	5.7%	1.9%
Software	2.4%	3.7%
Value added services	1.6%	1.9%
Biotech/Bioscience	1.6%	
Mixed	3.2%	3.7%
International finance	0.8%	
General business	0.8%	
Design/patent		3.7%
Sales/marketing center		1.9%
IT Consulting		3.7%
Technology development		3.7%
Clean energy technology		1.9%
Professional services		1.9%
Product development		1.9%
Unidentified	10.6%	11.1%
Total	123 (100%)	54 (100%)

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

Table 2-3 presents the list of the main industry sectors of the parks and companies represented by the respondents. A majority of manager-respondents (86%) represented parks whose main industry sector was Agro-food and Agriculture. The tenant-respondents, however, came from parks with a wide variety of main industry sectors they operated in. They represented sectors such as Agro-food & Agriculture, Computers & Informatics, Software, and many other areas.

Table 2-3 Management and Tenant Respondents: Main Industry of Parks/Companies

Main Industry Sectors of Parks	Management	Tenants
Agro-food/Agriculture	85.7%	12.4%
Biotech/Life Sciences	1.4%	
Computers/Informatics	1.2%	14.2%
Consumer electronics	0.4%	6.2%
Design/Engineering services	0.3%	6.2%
Education	0.6%	3.5%
Energy technology	0.4%	7.1%
Environment technology	1.2%	2.7%
Food technology	0.9%	0.9%
Industrial electronics	0.5%	1.8%
Medical technology	0.8%	8.8%
Nanotechnology	0.5%	0.9%
New materials	0.4%	0.9%
Pharmaceuticals	0.9%	6.2%
Pure research	0.3%	4.4%
Software	0.6%	12.4%
Telecommunications	0.8%	5.3%
Tourism services	0.5%	
Trade services	0.3%	
Value added services	0.3%	
Oil/Gas	0.3%	
Miscellaneous	1.8	6.2%
Total	123 (100%)	54 (100%)

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

Table 2-4, Table 2-5 and Table 2-6 provide further information on the profiles of the parks represented by management respondents. The major highlights of the information presented in these figures are:

Table 2-4 Management Respondents: Number of Companies Located in Park

Number of Companies located in the park

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<50	74	60.2	64.9	64.9
	50-100	22	17.9	19.3	84.2
	101-500	12	9.8	10.5	94.7
	501-1000	5	4.1	4.4	99.1
	>1000	1	.8	.9	100.0
	Total	114	92.7	100.0	
Missing	System	9	7.3		
Total		123	100.0		

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

60% of the parks represented had fewer than 50 companies located there followed by 18% of the parks with 50-100 companies located in the technology park. About 5% of the companies had as many as 500 companies or more. (Table 2-4)

Table 2-5 Management Respondents: Number of Business Organizations Located in Park

Number of business organizations located in the park

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<50	95	77.2	87.2	87.2
	50-100	7	5.7	6.4	93.6
	101-500	2	1.6	1.8	95.4
	501-1000	4	3.3	3.7	99.1
	>1000	1	.8	.9	100.0
	Total	109	88.6	100.0	
Missing	Don't know	1	.8		
	System	13	10.6		
	Total	14	11.4		
Total		123	100.0		

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

- 77% of parks represented by management respondents had less than 50 business organizations and about 6% had 50-100 business organizations. (Table 2-5)

Table 2-6 Management Respondents: Number of Universities / Research Institutions Located in Park

Number of Univeristies and Research Institutions located within 50 miles of the park

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	61	49.6	53.5	53.5
	6-10	22	17.9	19.3	72.8
	11-20	16	13.0	14.0	86.8
	21-40	11	8.9	9.6	96.5
	>40	4	3.3	3.5	100.0
	Total	114	92.7	100.0	
Missing	System	9	7.3		
Total		123	100.0		

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

- 50% of parks represented had 1-5 universities and research institutions located within a radius of 50 miles from the park whereas about 18% had 6-10 such institutions located within such radius. (Table 2-6)

Table 2-7 and Table 2-8 present data from responses received from park tenants. The major highlights are as follows:

Table 2-7 Tenant Respondents: Average Annual Revenue from Operations in Park

Average annual revenue

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<$1 Million	18	33.3	45.0	45.0
	$1 Million - <$5 Million	2	3.7	5.0	50.0
	$5 Million - <$10 Million	3	5.6	7.5	57.5
	$10 Million - <$100 million	7	13.0	17.5	75.0
	>=$100 million	10	18.5	25.0	100.0
	Total	40	74.1	100.0	
Missing	Not available	10	18.5		
	System	4	7.4		
	Total	14	25.9		
Total		54	100.0		

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

- One third of the companies represented are small with revenues less than US $1 million. At the same time there were also companies whose revenues exceeded $100 million (Figure 2-7).

Table 2-8 Tenant Respondents: Number of Full Time Employees in Operations in Park

Number of full time employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<5	13	24.1	26.0	26.0
	5-20	12	22.2	24.0	50.0
	21-50	7	13.0	14.0	64.0
	51-100	4	7.4	8.0	72.0
	>100	14	25.9	28.0	100.0
	Total	50	92.6	100.0	
Missing	System	4	7.4		
Total		54	100.0		

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

- The number of full time employees working in companies represented by tenants ranged from less than 5 to greater than 100. About 50% had less than 20 employees and about 25% had more than 100 employees. (Table 2-8)

2.4 Tools and Techniques of Data Analysis

As indicated in a previous section detailing the different sources of data, this study resulted in the collection of a significant amount of data through both secondary and primary sources. In order to analyze this data, we used Excel and Statistical Package for Social Sciences (SPSS). Excel was used primarily for the purpose of presenting data in graphs and charts; SPSS was used for performing statistical analysis of primary data.

We used a number of statistical analysis techniques to perform data analysis. First and foremost, we used frequency distribution to present and analyze data. Where needed, we also generated and analyzed descriptive statistics such as the mean and the median. For the purpose of conducting an empirical test of the model, we used regression analysis which allowed us to examine whether or not the presence or absence of the 12 factors identified in our analytical model had any influence on the relative success of the parks represented by our management-respondents. We also used a statistical technique called Factor Analysis for the purpose of reducing the data contained in 15 variables representing 12 factors into a smaller number of uncorrelated factors or dimensions. This task was necessary to avoid the problems associated with multicolinearity of independent variables in the regression analysis.

2.5 Limitations of the Study

As in any other study with such a large scope, this study too has a known limitation. That limitation pertains to the sample size of tenant respondents. We contacted a large number of tenants through e-mails. Furthermore, as we mentioned earlier, we also contacted several people connected with parks all over the world seeking their help in getting tenants to complete our surveys. Although we made every effort to increase the sample size of tenants, at the time of writing this report, we were unable to get more than 54 tenants to respond to our survey. This definitely limited our ability to derive conclusions from the data collected from this group in the sample. However, the large sample size of management respondents enabled us to derive a number of meaningful conclusions relating to the major research objectives.

2.6 Summary

This chapter presented the research methodology we followed in order to achieve the objectives of this research. We started out with our theoretical model based on an extensive review of the relevant literature and consultations with experts in the field including visits to several parks. We used data collected from a sample of managers and tenants from parks all over the world for the purpose of empirically testing our model and addressing other areas such as the financing and marketing of parks. A number of statistical analyses were performed to derived meaningful findings and conclusions from such analyses. The following chapters present the major findings, conclusions and recommendations based on the analysis of both primary and secondary data specified in this chapter.

Chapter

3

3.0 The GLOINTECH Park Model

The Global Integrated Technology (GLOINTECH) Park Model for Identifying Key Success Factors.

3.1 Introduction

This chapter describes the analytical model that we used to drive our research and answer the research questions that arose from our research objectives. Instead of investigating the Key Success Factors ("KSFs") on an ad hoc or piecemeal basis, it is important to frame the research in a systematic and comprehensive manner so that the research questions raised by the research and management objectives can be properly answered. We first provide a brief introduction to the role and usefulness of model building and why the GLOINTECH was important for our research strategy and research study. Next, we briefly discuss the nature, role and definition of technology parks and related entities in order to properly frame the definitional context and utility of our model. We then review the literature on cluster and technology park formation including the most illuminating and popular models that are used to understand these phenomena. We then briefly discuss the most prevalent model for understanding clusters and technology parks, that of Michael Porter (1990). Based on this discussion, we then present our model, the Global Integrated Technology ("GLOINTECH") model and discuss its advantages over the extant models, particularly that of Porter. We end with a discussion on how we operationalized the model. A subsequent chapter (Chapter 6) discusses the empirical result of applying the GLOINTECH model to technology parks worldwide.

3.2 The Role and Utility of the GLOINTECH Model

Models enable the systematic examination of some object(s) or phenomenon(-na) and tell us something about those object(s) or phenomenon(-na). By their very nature, they simplify and omit some details about the object(s) or phenomenon(-na) they represent in order to focus on the key features or causes of the object(s)/phenomenon(-na). These details are usually irrelevant to the purposes the model is meant to serve. Finally, some models have the objective of recommending characteristics of the object(s) or phenomenon(-na) under study.

Thus, models are representations of real-life objects and phenomena that omit aspects that are considered irrelevant and outline the relationships considered important for the purpose of understanding or recommending characteristics of these objects or phenomena. For the purposes of the Sapiens Parque project, it was important for the GLOBUSTRAT team to develop a representative model of technology park success so as to understand what makes these parks succeed or fail and for recommending strategies and activities for the Sapiens Parque authority to undertake to maximize the chances of success. Such a model was developed to focus on the critical factors and relationships that created the conditions for technology park success and was meant to abstract from the myriad of irrelevant factors and details that were not important for such success.

Another benefit of developing an analytical model of technology park success was to provide a framework within which our analysis of the worldwide technology park industry could be conducted. The factors identified in our model based on the extant literature on technology parks provided us the means to focus on the key variables and issues that underlay technology park success or failure in different parts of the world while enabling us to understand the common factors and differences that accounted for the success or failure of technology parks. Such an analysis enabled us to draw upon the key features, characteristics and factors in the worldwide technology park development experience in order to make recommendations to Sapiens Parque management regarding the best alternative paths for successful park development.

The application of the model also provided us with the primary data and analytical results necessary to quantify and understand the causal factors underlying technology park success. There is very little empirical work on technology park success that one can draw upon to make an informed presentation about the key factors that affect technology park success. The few studies that are available are mostly descriptive and do not utilize a systematic approach to understanding technology park success. Our model and research study overcomes this significant gap in the study of parks and provides a comprehensive and quantitative causal evaluation of technology park success. Without the model, we could not have met the need of the Sapiens Parque management to understand the KSFs and the Key Failure Factors ("KFFs") in order to make the best managerial decisions that will ultimately result in the success of Sapiens Parque.

3.3 Definition and Role of Science and Technology Parks

Science and technology parks are localized concentrations of firms, research organizations, specialized services and other entities intended to promote growth in select technologies or groups of technologies. As such, science and technology parks aim to promote growth in particular areas of expertise and technology or the local economy by developing clusters of firms which are capable of playing a larger role at the regional and international level.

Science and technology parks have seen tremendous growth over the last three decades. The International Association of Science Parks ("IASP", see www.iasp.org) has more than 49 member countries outside the United States and over 250 member parks. IASP member parks vary widely in size with 50% of the parks with less than 50 tenants, 40% with between 50 and 200 tenants and 10% with over 200 tenants. Similarly the American association of university-related research parks ("AAURP"), located in Reston, VA (www.aaurp.org) has over 125 affiliated members and over 75 non-affiliated members who are located at universities and research conurbations across the United States.

The United States was the country where the technology park movement started with the establishment of the Stanford Research Park, in the San Francisco Bay Area (now in the Silicon Valley super cluster), in 1951 and the Research Triangle Park in the Raleigh-Durham area in 1959. Since then, more than 300 technology parks have been established in the United States, in addition to the large number of business parks which in practice house large numbers of technology firms and for all purposes may be referred to as technology parks.

Europe itself is also the home of a large conurbation of technology parks with over 200 technology parks in a variety of countries. The leaders in technology park development in Europe are England (63 parks), France (58 parks) and Finland (24 parks) (see www.unesco.org/pao/s-parks/europe/europe.htm).

The technology park movement in Asia has also made great strides as the increasing wealth of this region with fast-paced economic development creates the need and capability to develop world-class technology. Today, there are over 300 technology park-type entities (parks, incubators and innovation centers) in Asia. The leaders are Japan (125 entities), China (80 entities) and India (30 entities) (see www.unesco.org/pao/s-parks/asia/asia.htm).

The role of governments in the development of technology parks also varies between countries. While most European and U.S.-based parks are market-driven and generally privately owned, most parks in Asia and in developing countries are larger parks funded by government.

Technology parks act as incubators for start up firms and magnets for established firms looking for synergies with their internal assets. Such localized environments typically bring together sources of patents, skilled labor (e.g. universities) and firms looking to commercialize new innovations. However, it is not enough for technology parks and tenant firms to benefit from this aggregation effect. It is critical that parks and tenant firms develop the ability to adapt to fast changing technologies and global trends. Such adaptive capability is what sets Silicon Valley ahead of Route 128. [1]

Paul Krugman argues that companies operating within a cluster are relatively better capable to withstand the effects of economic downturns. Krugman makes the point that in the face of trade liberalization and global competition firms within a cluster develop economic advantages otherwise not attainable outside the clusters. [2]

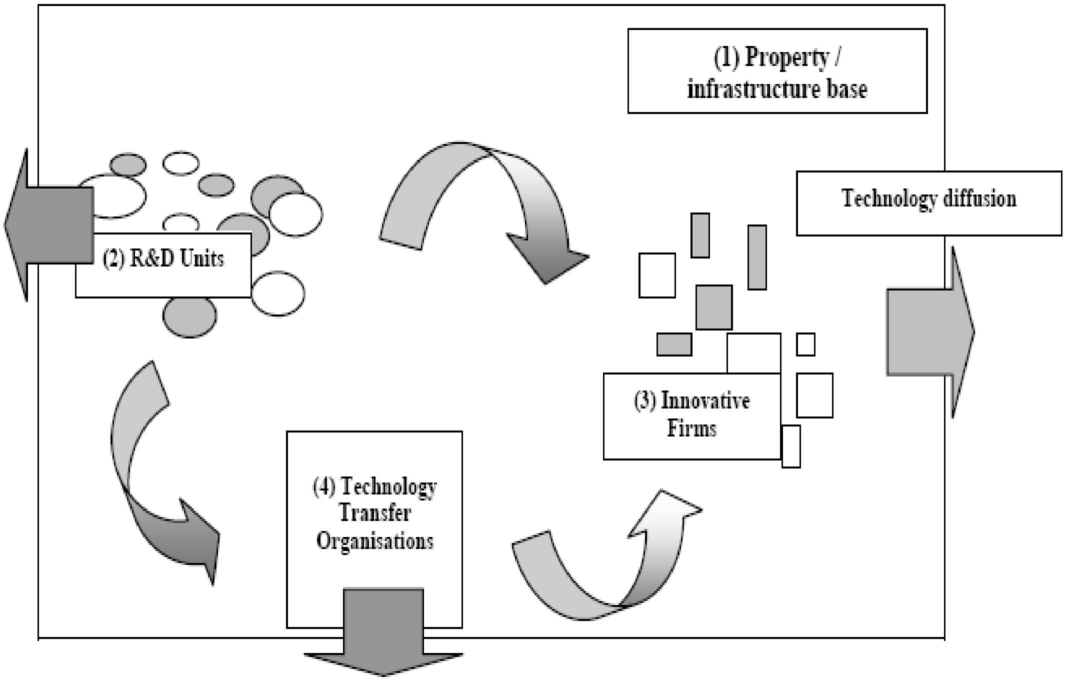
Our research looks at technology parks operating and competing in a global environment where borders and oceans no longer constitute barriers to trade, competition, and foreign direct investment. Technology parks are no longer competing for supply and demand in their immediate proximity but instead more and more parks promote themselves and establish alliances on a global level.

For the purpose of our study, we adopted the following definition of science/technology parks used by the IASP:

> *"A Science / Technology Park includes the following four components: (1) it is a property based initiative, which (2) has formal operational links with a university, higher education institution or major center of research; (3) it is designed to encourage the formation and growth of knowledge based businesses and other organizations, normally resident on site; and (4) it has a management function which is actively engaged in fostering the transfer of technology and business skills to the organizations on site." (IASP Directory 1998).*

Figure 3-1 from Nikolaus Komninos' *Intelligent Cities* (2002) provides a pictorial representation of this definition, showing the constituent elements and the relationships of integration, based on technology transfer and co-operation between and from the R&D institutions and the innovative firms.

Figure 3-1 Science and Technology Park Elements and Relationships



Source: Nikolaus Komninos, Intelligent Cities, 2002

3.4 Literature Review and Review of Models of Clusters and Technology Parks

There is a large literature on the evolution and formation of clusters that provides the basic fundamentals for modeling technology parks. Porter (1998) defines a cluster as follows:

> *"A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of a cluster can range from a single city or state to a country or even a network of neighboring countries."*

According to Porter and theorists and practitioners, in the filed of economic geography, clusters need to be understood in the context of global and local competition theory and the influence of location in the global economy. The cluster concept helps to understand local, state and national economies and their role in economic success. Even as the much-heralded death of distance is touted as the new way the world works, the importance of location and geography has been enhanced as firms, organizations and government have understood the importance of clustering.

Many industries tend to cluster rather than not (see Krugman, 1991) and such clustering has been found to be empirically greater than would be if geographic distributions of firms were random. This has led to systematic attempts by economists, geographers, social scientists and management practitioners to try to understand the economics and management of clusters.

3.4.1 Marshall's Model of Industrial Districts and Agglomeration Economies

Alfred Marshall, otherwise known as the father of cluster theory, focuses on traditional socio-cultural factors which concern the quality of the social milieu of industrial districts, and which only indirectly affect the profits of firms. Among such factors Marshal emphasizes in particular:

- The mutual knowledge and trust that reduces transaction costs in the local production system;
- The industrial atmosphere which facilitates the generation and transfer of skill and qualifications of the workforce required by local industry; and
- The effect of both of these aspects in promoting innovations and innovation diffusion among small firms in industrial districts.

Marshall advanced the cluster concept in 1890 to explain national economic success in part on the development of localized concentrations of industrial specializations. His concept further explained that industrial specialization in a given geographical location is influenced by the presence of natural resources and materials, by the existence of nearby markets, or simply by an "accident of history." Such geographical specialization tended to become self-reinforcing through the operation of what he termed as "localization economies".[3]

Alfred Marshall's (1920) work on industrial districts stressed three reasons for the clustering of industry:

1. Benefits from pooling resources, particularly labor resources.

2. Enhancing information flows between people and firms.

3. Improved access to specialized inputs.

According to Marshall, the existence of these three features in a cluster created a positive feedback loop and agglomeration economies, whereby firm concentration brings additional labor and other inputs which, in turn, attracts additional firms, leading to a beneficial spiral of further efficiencies and wealth creation and concentration. Thus, resource pooling, information network effects and input access or improved factor availability can be seen as underlying cluster success.

Following Marshall's work, an extensive literature on agglomeration economies developed including the pioneering work of Weber (1929), Losch (1954), Isard (1956), Lloyd and Dicken (1977), Goldstein and Gronberg (1984), McCann(1995) and Fujita and Thisse (1996). All these studies stressed the importance of increasing returns and economies internal and external to the clusters as they formed and grew. The variables that emerged were infrastructure, input access, market demand conditions, industrial base heterogeneity and communications technologies captured by the generalized urban agglomeration economies. This literature also stressed input cost minimization, the location advantages of market-proximate location and the input specialization possible due to the extent of the local market.

Another strand of the literature focused on knowledge spillovers, transfers and the benefits of learning-by-doing due to feedback loops, like those between product development and manufacturing. This feedback loop allows a firm to design and produce new products using related or similar technologies at one location and thus become a strong force for the concentration of both of these activities (Pred, 1965 and Webber, 1972). Work on knowledge spillovers between universities and firms highlights beneficial and wealth-enhancing aspects of such collaboration (Jaffee, 1989; Saxenian, 1994 and Anselin, Varga and Acs, 1997). The variables that emerge from this literature are the complementary services/inputs variable and the knowledge spillover/transfer variable.

The work on increasing returns pioneered by Arthur (1986), Romer (1986) and Krugman (1991) focused on the variables of path dependence, cumulative causation and increasing returns from agglomeration.

3.4.2 Transactions Costs and Dunning's Eclectic Model

The pioneering work of Ronald Coase (1937) on transactions costs and the firm launched a new literature to understand the formation of business firms and larger entities (such as joint ventures, multinational corporations etc.) using the insight of production and transaction cost (i.e. the costs of searching, identifying, negotiating, contracting, monitoring and controlling transactions between entities) minimization. For our purposes, the major insight with regard to clusters that emerges from this literature is that of Dunning's (1979) eclectic model of international production and investment.

In explaining the rise of multinational corporations, John Dunning (1979) advocates that companies investing overseas are motivated by four key drivers:

- Seeking of new markets
- Seeking resources needed for their products (human or otherwise)
- Seeking efficiencies helping them expand their competitive advantage
- Seeking strategic assets

Before seeking new markets, firms start production locally. Once production becomes established and local markets approach saturation, firms look to expand into new and typically undeveloped markets. In order to reduce costs firms establish production capabilities closer to new markets.

By establishing production across geographic space, multinationals seek and promote foreign direct investment. According to Dunning's [4] eclectic theory, firms which benefit the most from internalizing activities will tend to gain competitive advantage in global markets. As such, the likelihood of a firm engaging in foreign direct investment is based on three factors: [5]

- "Ownership Assets" according to Dunning represent, for the most part, intangible assets giving the firm a competitive advantage in a specific area over firms in the new target market.

- The benefits of internalizing the asset and extending the enterprise's activity to include operation is a foreign country must exceed externalizing the property rights through avenues such as licensing, outsourcing or subcontracting.

- The necessity of having some factor inputs outside the home country which provide an advantage to production in a foreign country.

Thus, according to Dunning, there are three necessary conditions for international production to take place:

- Ownership or Firm Specific Advantages ("FSAs") such as a proprietary technology, specialized know-how, a patented process or technology, managerial or marketing expertise etc. that are internal to the firm but can be dissipated if transferred through a license or other external arrangement;

- Location Specific Advantages ("LSAs") (also called Country Specific Advantages or "CSAs") such as lower production and assembly costs, availability of a pool of skilled labor, local market demand, favorable location near markets or on trade roots, availability of capital and other inputs etc. which provide locational advantages that the investing firm can exploit in order to gain from its FSAs;

- Internalization Advantages (IAs) that allow the firm to sustain its FSAs by choosing modes of business organization (e.g. forming a wholly owned subsidiary or other form of foreign direct investment) where control of the FSA is not ceded to competitors or partner firms.

Dunning's model provides a number of variables for thinking about cluster/technology park formation and success. Looking at clustering from the point of view of FSAs, clearly variables like firm strategy, presence of suppliers and related firms, and the existence of inter-firm linkages and collaboration are key variables in the location decision. Similarly, CSAs such as favorable factor conditions, favorable government policy, a favorable business and socio-political climate and the presence of local innovation and entrepreneurship become key factors in the choice of location.

Finally, the presence of IAs created by the protection of private and intellectual property, enforcement of property rights provide an incentive for firms to locate in a region or cluster. These variables thus become candidates for inclusion in a comprehensive model of technology park success.

3.5 Porter's Four Diamond Model of Clusters and Technology Parks

The most celebrated and used model of cluster formation and success is Michael Porter's Four Diamond model (1998) based on the work he had done in developing the theory of the Competitive Advantage of Nations (Porter, 1990). In this model, Porter takes a dynamic view of competition and looks at locational advantage beyond the economist's standard model of comparative advantage. According to him, location affects competitive advantage through influences on productivity, or more precisely productivity growth. In turn, the productivity of a location depends on how firms compete at that location, not on the industries in which the firms compete. The quality of the business environment in terms of the availability of the supporting infrastructure, the sophistication and quality of demanding local customers and the presence of capable, locally-based suppliers.

Porter characterizes the effect of location on competition in terms of four inter-related factors that also impinge upon the attractiveness of the location for firms seeking to gain competitive advantage. These four factors or "diamonds" in his model are:

- Factor (or input) conditions in terms of the quantity, quality, specialization and cost of natural resources, human resources, capital, physical infrastructure, administrative infrastructure, information infrastructure and scientific and technological infrastructure of that location.

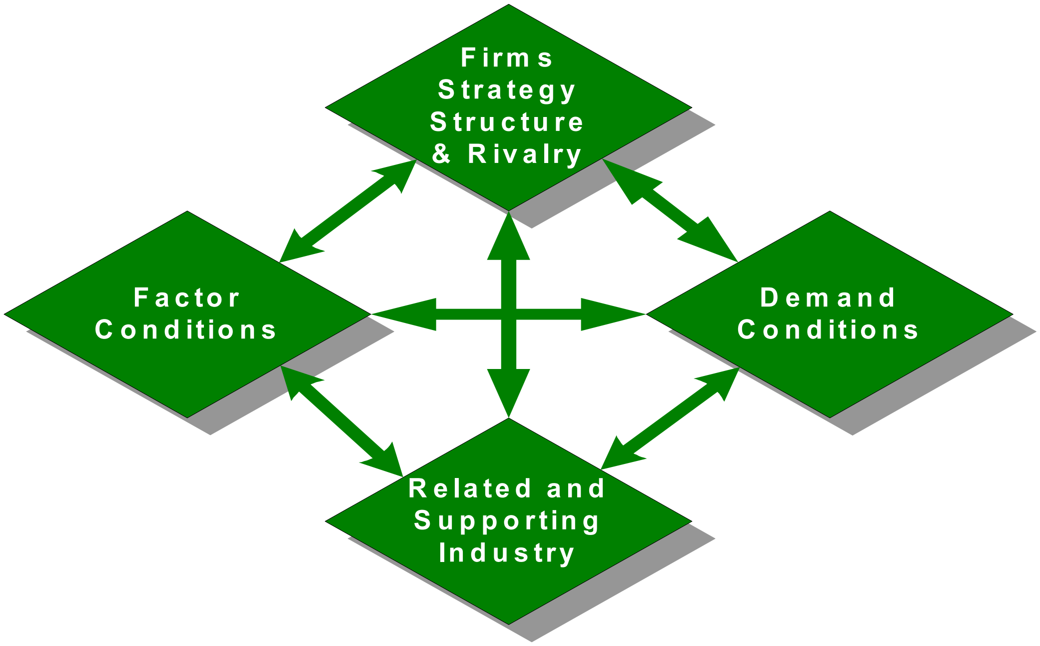
- Demand conditions as represented by sophisticated and demanding local customers. These conditions also include unusual local demand in specialized segments that can be served globally.

- The context for firm strategy and rivalry which encourages significant amounts of appropriate investment and sustained upgrading of the competitive environment at the location and vigorous competition among locally-based rivals.

- The presence of related and supporting industries which include capable, locally-based suppliers and that of competitive related industries such as accounting, finance, legal services, transportation and logistics etc.

The presence of these four diamonds in the appropriate proportions at a locational provides a competitive advantage to that location and results in firms, organizations and associations congregating at that location to take advantage of these locational advantages. The Four Diamond Model is shown in Figure 3-2 below depicting these four sources of locational competitive advantage.

Figure 3-2 Porter's Four Diamond Model



Source: Michael Porter, The Competitive Advantage of Nations, 1990

According to Porter, clusters (and by inference, technology parks or any agglomeration of firms) are best seen as manifestations of the interactions among all four factors. According to Porter, clusters affect competition in three ways:

> *"…First, by increasing the productivity of constituent firms or industries; second, by increasing their capacity for innovation and thus for productivity growth; and third, by stimulating new business formation that supports innovation and expands the cluster. Many cluster advantages rest on external economies or spillover between firms and industries of various sorts…."*(Porter, 1998)

Thus, any location that is well endowed with the characteristics reflected in the four diamonds is likely to be very successful in attracting and retaining economic activity in the form of firms and supporting institutions and is likely to experience a positive spiral of attraction, retention and growth leading to successive cycles of such activity. For our purposes, then, Porter's model provides a rich source of the variables that are likely to constitute the KSFs for a particular cluster or technology park.

3.6 Beyond Porter: The GLOINTECH Model and Technology Park Success Factors

This section presents the limitations of Porter's Four Diamond model for explaining clusters and technology parks and provides a rationale for the GLOINTECH model's inclusion of key success-factor variables beyond Porter's model.

3.6.1 Key Success Factors Beyond Porter

While Porter's model presents a rich source of factors that affect cluster and technology park success, it does not include or give importance to key factors that are mentioned in the literature and would seem to be important in understanding the key success factors for the growth of such entities. In particular, his model underplays the role of government and what may be called the element of chance, even though he mentions them in his discussion of clusters. The experience with technology parks worldwide would seem to indicate that government has had a (sometimes crucial) role to play (as, for example, in Asia) in terms of either a deregulating and facilitating role or in terms of a more interventionist role. In any case, the inclusion of government as a key factor should be an empirical matter, especially given the role government has played in economic development. As regards the element of chance (discussed below), the same argument applies.

Porter's four diamonds focus on economic factors without any attention to "soft" and institutional factors that may be critical for technology park success. For example, Porter does not include any variables pertaining to "soft" issues like the business climate and socio-political climate which, though they cannot be measured in any meaningful way and their impact on productivity cannot be quantified, are nevertheless recognized to be powerful influences for locational success. The literature on economic development and economic geography stresses the importance of such "soft factors" (Rosenberg and Birdzell, 1986; Barro, 1998; Landes, 1999).

In addition, the work of the "New Institutionalists" like Nobel Laureate Douglass North have pointed out the importance of institutional factors like private property rights and their enforcement, political stability, absence of corruption, existence of a fair and well-administered legal system etc. as being critical for successful economic outcomes. These factors are not captured in the Porter model.

Recent work on the sources of innovation (Nelson and Winter, 1982; Nelson, 1992 and Mokyr, 1990, 2000) and entrepreneurship (Kirzner, 1979, 1979; Bhide, 2000) has stressed the importance of these two variables for economic success. It has been shown by economists and management practitioners that creating a climate for entrepreneurship and innovation is critical for favorable economic outcomes. It is important to include these two variables in explaining the success of technology parks.

Other factors that Porter ignores but that have been mentioned in the literature reviewed in an earlier section include the following:

- Agglomeration economies or the high concentration of firms.
- Path dependence or the presence of historical factors and developmental trajectories.
- Network and spillover effects of the existence of inter-firm linkages and connections.
- Anchor effect of large firms attracting other large firms and their supplier and buyer eco-systems.

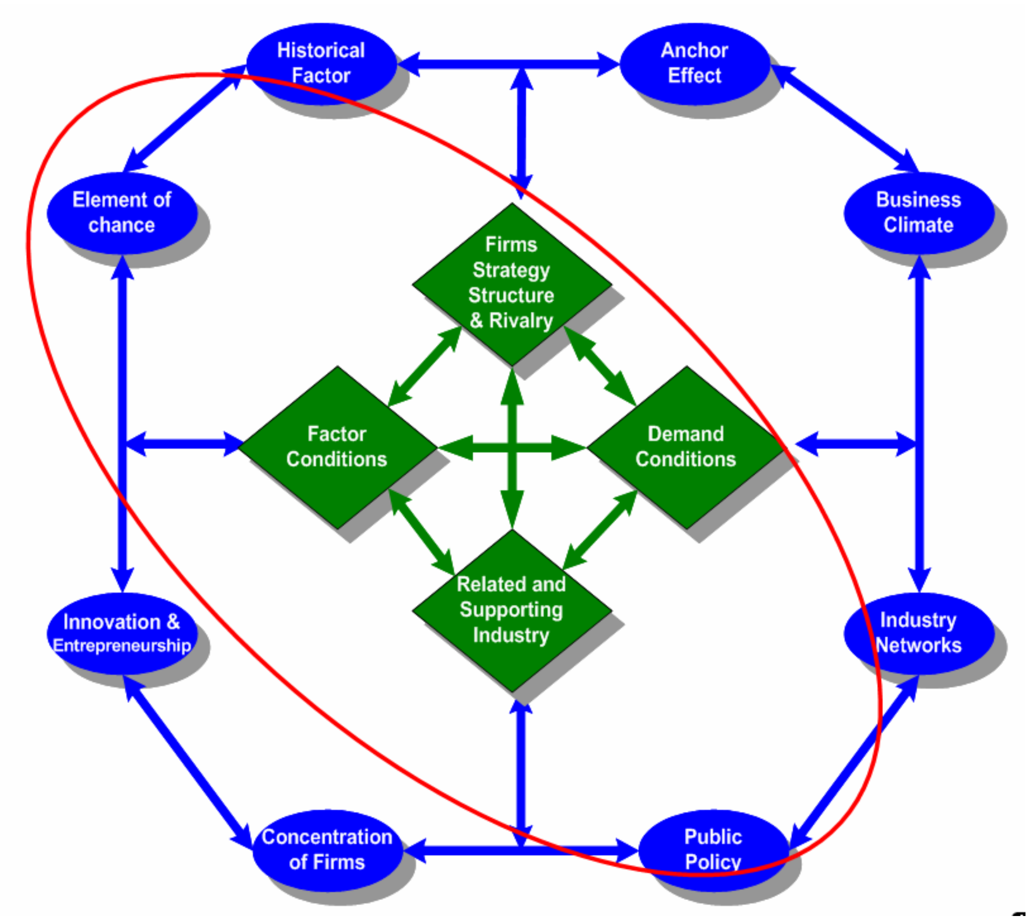
It is important to check on the empirical importance of these factors and to see if these variables are key success factors at the same level as Porter's economic factors.

Thus, the full model for identifying the KSFs for technology park success in the view of the Sapiens Parque GLOBUSTRAT Consulting team should consist of the following 12 variables based on the extension of Porter's model to include eight other General Economics and Management System (GEMS) factors:

- Porters Diamonds:
    - Factor conditions
    - Demand conditions
    - Firm Structure and Rivalry
    - Related & Supporting Industry
- 4 GEMS "Hard" Factors
    - Public Policy
    - Anchor Effect
    - Concentration of Firms ("Agglomeration")
    - Historical Factors ("Path Dependence")
- 4 GEMS "Soft" Factors
    - Business and Socio-political Climate
    - Innovation and Entrepreneurship
    - Industry Networks
    - Element of Chance

The GLOINTECH model with the full 12 factors is shown in Figure 3-3 below.

Figure 3-3 The GLOINTECH Technology Park Model



Source: GLOBUSTRAT TEAM, California State East Bay, TEMBA Program

3.6.2 Description of the GLOINTECH 12 Factor Model

As stated previously, at the core of the GLOINTECH model above are Porter's 4 diamonds. The 8 hard and soft GEMS factors provide the institutional, historical, climate and concentration/linkage variables that can more fully explain the success of a location like a technology park. Each one of the variables, including Porter's original four diamond variables are discussed in turn below in the context of technology parks and their role in their success.

3.6.2.1 Factor Conditions

Factor conditions are input factors which are key to the development and success of any technology park.

- Infrastructure: This includes land, roads, other transportation means, telecommunications network infrastructure and power but also includes the administrative, information and scientific and technological infrastructure. Most technology parks have established a foundation of infrastructure to support tenant firms. What differentiates science and technology parks is the quality, upkeep and upgrading of the infrastructure, especially the administrative and information infrastructure. Even world renowned technology parks such as Stanford Technology Park, which is recently having difficulty attracting tenant firms due to outdated infrastructure and facilities, must maintain and upgrade infrastructure.

- Capital: Whether private or public, local or foreign capital funding is a key input to the success of science parks. Sources of funding include venture capital, traditional bank loans, government funding and funding from family, friends and fools (3Fs). Public funding for technology parks depends on government policies and, in general, is more readily available outside the United States of America, where venture capital and traditional bank finance dominates.

- Labor: Skilled labor is an output of strong university programs and a result of experience in specific industries. Availability of skilled labor in and around a science/technology park is a necessary factor for attracting tenant firms. However, the pace of industrial and technological change requires a work force that is mobile and able to adapt to new industries.

3.6.2.2 Demand Conditions

Local and global demand conditions are important for the location of firms in technology parks. Without such demands, technology parks turn into isolated research institutions. Demand conditions promote growth for incubator firms as well as attract large corporations to the park. Complex demand conditions put additional pressure on companies to compete for market share through continuous innovation.

3.6.2.3 Related and Supporting Industries

Related and supporting industries provide the support needed to sustain the operation of science/technology parks. Industries such as consulting firms, accounting firms, law firms, banks and other financial institutions, equipment suppliers and suppliers of tenant firms are a few examples. Complementary industries can act as catalysts for upgrading the technologies and equipment within a park. They are the outlet through which park tenant firms become familiar with the advancements in technologies globally.

3.6.2.4 Firm Strategy, Structure, and Rivalry

Most tenant firms within a technology park might not be in direct competition with each other instead they might serve different industries. Being within and in the proximity of the park, tenant firms benefit from cooperative synergies and competitive benchmarking and from a certain level of cooperation and sense of productive rivalry. Inter-firm dependencies and interactions is the channel for park tenant firms to become stronger competitors in the global market.

3.6.2.5 Business Climate: This factor includes two sub-factors namely, a favorable business climate and a favorable socio-political climate. These can be briefly described as:

- Favorable business climate: Local support of private enterprise/entrepreneurship; a historic record of being business friendly; the existence of a climate for risk-taking and for business innovation; a local "results-oriented" business culture; business and government collaboration and the enforcement of private property laws along with a low risk of nationalization characterize a favorable business climate. In addition, competition, transparency, a growing economy and an open trading system should be important for the success of technology parks.

- Favorable socio- political climate: This includes factors like political stability, a low crime rate, low levels of corruption, labor peace, security, social stability and harmonious employer/labor relations, which should play a major role in the success of technology parks.

3.6.2.6 Industry Networks

These are direct and indirect interdependencies between firms within an industry. These industry networks facilitate knowledge sharing. Industry networks can trigger alliances or competition, both can be growth ingredients for park tenant firms.

3.6.2.7 Public Policy

According to M. Porter, public policy is assumed and constitutes a prerequisite not a driver for productivity and competitiveness. However, our research recognizes the importance of public policy and as such we have allocated a good portion of our study on public policy. However, local and national public policy must be aligned and even integrated to promote growth in technology parks and related industries. Policies related to regional development, trade, taxation, and financial incentives, if properly set, should play a key role in the development of technology parks.

3.6.2.8 Concentration of Firms

This factor refers to the proximity of firms within a specific industry or what are called agglomeration effects. Such proximity encourages cooperation, competition and provides for a localized pool of skilled labor. It also refers to the beneficial cycle of firm attraction and establishment, growth and economic success and attraction of other firms to the technology park or the region.

3.6.2.9 Innovation and Entrepreneurship

Tenant firms within technology parks benefit from early learning about evolving technology, component and machinery availability, service and marketing concepts. This learning is facilitated by the proximity effects, the ease of site visits and frequent face-to-face contacts. Isolated firms, in contrast, face higher hurdles to acquire information and longer time to come up to speed with the most advanced trends in technology and their application.[6]

3.6.2.10 Anchor Effect

Attracted by competition, supply of innovation, or a pool of skilled labor, anchor companies are well established companies interested to locate in or within close proximity of a technology park. Having a leading and well known firm associated with a park helps in promoting the park as a desired location for other supporting or competing firms. Leading firms also bring in their suppliers, complementors and even customers, thus impacting the growth of the park. It would seem that the attraction of anchor firms would facilitate the success of technology parks.

3.6.2.11 Element of Chance: Some events can never be predicted and when they first happen no one recognizes their immediate impact on the turn of events. Examples can be government decision to go to war or starting a strategic space exploration program, immigration of certain scientist or the presence of philanthropists. Similarly, the location of a key entrepreneur or company founder for "roots" or health reasons may cause a technology park to succeed.

3.6.2.12 Historical Factors: Accidents of history influence the path countries take and have long term cultural impact on the national endowments of a country. The release of internet technology for commercial usage has had tremendous impact on the competitive advantage of nations and has given a different meaning to globalization. World War II and the investments made in the Japanese economy had a tremendous impact on the industrialization of Japan after the devastation of war.

In order to operationalize the full-blown GLOINTECH Model for empirical testing and to assess the importance of the KSFs for technology parks, these 12 factors were further broken down in to 15 factors with the breaking down of the Factor Conditions variable into the sub-factors of Availability of Labor, Availability of Capital and Availability of Infrastructure; and the bifurcation of the Business Climate variable in to the Favorable Business Climate and the Favorable Socio-political climate variables.

3.7 Summary

In this chapter, we reviewed the literature on the causes of locational success in order to identify the key factors that may affect technology park success. We examined the major models that explain the formation and success of clusters (and hence, technology parks). We reviewed Alfred Marshall's Industrial Districts Model and John Dunning's Eclectic Model of international production location and identified a number of variables that may have an impact on technology park success. We also reviewed the dominant model of cluster development and success, Michael Porter's Four Diamonds Model. We then reviewed the limitations and exclusions of this model and identified what elements may be missing from this model of locational success. We also examined the "new institutional economics" literature and the literature on economic geography in order to identify additional variables that may have an impact on technology park success.

Based on the identification of these variables, we presented a more comprehensive model of technology park success that included Porter's four diamonds but substantially and critically extended his work to include 4 hard factors and 4 soft factors that had not been previously integrated in to the technology park or cluster modeling literature. These extra 8 factors include the following:

- 4 GEMS "Hard" Factors
    - Public Policy
    - Anchor Effect
    - Concentration of Firms ("Agglomeration")
    - Historical Factors ("Path Dependence")

- 4 GEMS "Soft" Factors
    - Business and Socio-political Climate
    - Innovation and Entrepreneurship
    - Industry Networks
    - Element of Chance

While Porter had discussed two of these additional eight factors (public policy and the element of chance) he chose to underplay their importance and not include them in his model on grounds of the first being a hygiene (or base) factor and the second being intractable. We have tried to remedy this lacuna especially given the large role for government in the development of technology parks in many countries.

Finally, we concluded with a description of the key factors in our GLOINTECH Technology Park model and the implications they had for the success (or failure) of technology parks.

The next chapter provides an overview of the worldwide technology park industry by analyzing the large number of secondary sources available. The purpose of this detailed industry analysis is to understand the best practices and key success factors for technology parks worldwide so as to provide the information necessary to make appropriate recommendations to the management of Sapiens Parque based on this secondary information and the primary data collected by the team. A supplement to the next chapter is the more detailed information for a select collection of worldwide technology parks can be found in the technology park profiles included in Appendix 1.

3.8 Sources - Chapter 3

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Chapter

4

4.0 Industry Analysis

Industry analysis and profiles/analysis of selected key technology parks worldwide.

4.1 Introduction

This chapter provides an overview of the technology park industry worldwide. The objective of such an analysis is threefold:

To provide an overview of the key features and characteristics of technology parks in the different regions of the world so as to compare and understand their common features and their differences in the specific situational context within which these parks are located.

To understand the best practices and the Key Success Factors (KSFs) and Key Failure Factors (KFFs) of these parks based on secondary sources so as to provide further data support for the primary data analysis conducted by the GLOBUSTRAT consulting team.

To provide the Sapiens Parque management with profiles of major technology parks in different regions of the world as per the research objectives identified for this study. Our strategy was to have each team member study at least one successful park and one unsuccessful park in each major region of the world. In actuality, many team members considered more than one park in their region. These profiles are presented in an Appendix 1 for the management and staff of Sapiens Parque to review and understand the key features.

The chapter first provides a brief nomenclature of the types of firm and technology conurbations that are normally subsumed under the technology park designation. This is done in order to fully understand the key features and characteristics of these conurbations and their implications for this study. Next, a brief history of the technology park movement is provided, including the major developments in the technology park industry in different parts of the world.

A major objective of the study was to understand the global best practices and KSFs of technology parks in the world. The third part of this chapter synthesizes the major lessons learned about technology park development and management in four major regions of the world, namely North America, Asia and Oceania, Europe and South America. The best practices and KSFs/KFFs in each region are identified as well as the major features of the technology parks in each region are isolated.

Finally, a brief discussion of the major features of the technology park profiles is provided with a reference to the detailed park profiles provided in Appendix 1. To wrap up the chapter, some conclusions and a summary is provided.

4.2 Nomenclature of Technology Conurbations

The keys to expanding the technological capacity of a region or country include:

- Knowledge creation, normally the preserve of research centers and university laboratories;
- Knowledge acquisition, adaptation and dissemination, generally a task that falls to enterprises, in both the private and public sectors, but sometimes to universities and research centers as well;
- Human resource development, often a task for universities and higher vocational training institutes;
- Financing, mostly private especially in developed countries but also in fast developing countries but based in large measure on government funding in many developing countries;
- Science and Technology infrastructure building and support services, largely the province of multinational corporations and private enterprise but the province of governments in the developing world.

Initiatives that have been used as vehicles to drive technological capacity-building include technology parks, technology clusters, innovation centers, and research networks. The past three decades has witnessed the emergence and evolution of various Science and Technology capacity-building initiatives. While these concepts are meant to be distinct, their nomenclature (sometimes their format and objectives) may be muted with distinction lines blurred. Nonetheless, for the most part, these technology capacity-building initiatives possess distinct characteristics of physical location and varying degrees of co-operation between public- and the private-sector institutions. One common thread, however, is the intentional focus on bridging the gap between industry and academia, promoting discovery and innovation within small and medium-sized enterprises (SMEs) and encouraging investment in technology-based start-up firms.

As a means to drive job creation and tax revenue increases, and despite a lack of local expertise in a certain technology, technology parks (or similar initiatives) can help developing countries attract foreign direct investment. The following is a brief description of the more common forms of Science and Technology initiatives.

4.2.1 Technopoles

Technopoles extend over a large well-defined geographical area (greater than 50 hectares) and usually include multiple cities. Because of the enormous regional presence and the extensive urban development (that usually helps found or accompany the technopole establishment), heavy government involvement is almost always necessary. The exchange of innovative expertise and close collaboration between public and private institutions are the focus. As a result, technopoles are normally centered around or include universities and research labs. Technopoles seek to offer attractive environments and technology transfer services to draw existing technology firms from outside the geographic area. Resident firms can range in size from small and medium-sized enterprises (SMEs) to large national and multi-national corporations (MNCs). A technopole may be synonymous with technology cluster or science city and may encompass multiple technology, university, research, or innovation parks. Examples of technopoles include the Sophia-Antipolis technopole in France, the multimedia Supercorridor in Malaysia and the Biopolis technopole in Singapore.

4.2.2 Technology Parks

Technology parks focus on the transfer of technological innovation and accommodate companies that are involved in the application of high technology involving R&D, production, sales and servicing. They differ from science and research parks (see below) in that they have a greater emphasis on production. Although similar to technopoles, technology parks cover only a medium expanse (usually 10-50 hectares) and they tend to have a more local reach. Technology parks seek to stimulate and develop knowledge-based SMEs, although the focus is placed on the actual "transfer" of technology and innovation rather than on the creation of it. It is because of this primary focus on the "transfer" of technology that the presence of a university (in the technology park) is not essential. Technology parks include such tenants as existing technology firms, new ventures or entrepreneurial firms, service firms, finance institutions and governmental agencies.

4.2.3 Science or Research Parks

Science or research parks are very similar to technology parks, in fact, they can be synonymous. They are comparable in size to technology parks and seek to development SMEs; however they have a few fundamental distinctions. First, the science or research park is usually located within or near a university or research institute. Second, the science or research park's primary focus is on the creation of technological innovation rather than on the transfer of such technological advancements. Its emphasis is on research rather than development. And a key feature is the liaison with academic institutions and research at the leading edge of science and technology. There are even some distinctions among science and research parks themselves. One main distinction lies within focus, again, whereby a research park will have an almost absolute focus on research whereas a science park has a somewhat more expanded focus on product design & prototyping.

4.2.4 Innovation Centers and Business Incubation Centers (BICs)

Innovation centers and Business Incubation Centers (BICs) promote the creation of advanced technology through a focus on new enterprises with unique technological ideas that are likely to lead to a new and marketable product. However, they have a smaller geographical footprint and are usually less than 30,000 square meters in area. There is a heavy reliance on university labs and research centers, and an innovation center or BIC may sometimes locate within a University campus. Based on incubation schemes, their primary goal is to assist new high-technology firms through their pre-launch, launch and early operational phases. One way they do this is through shared resources. For example, members are usually provided with access to research and development (R&D) facilities and equipment from research centers or university laboratories. Among the many support services offered to tenants (such as financial, legal, facility, etc.), tenants are given guidance and assistance with becoming members of local or regional innovation networks.

Due to the space and resource limitations and the demanding nature of tenant support, smaller, younger firms are usually given tenancy priority. The innovation center or BIC process has a life cycle, and the related incubation process usually ends after a finite period of time with the tenant "graduating" the start-up phase (and relocating outside of the property) or with the termination of incubation relationship.

Sometimes, distinctions are made between Innovation Centers and Business Incubation Centers. At this fine level of distinction, the objective of the innovation center is the setting up of high technology businesses with high market risk and to provide services that include technical services and advice on marketing, finance and technology. Business incubation centers, on the other hand, have a marginal technology orientation and have the objective of increasing the chance of survival and the rate of growth of newly created firms by providing modular building facilities, common technical facilities, and back-up services and managerial support.

4.2.5 Innovation Networks

Innovation networks can be physical or virtual. They are formal and informal networks of public and private industry professionals who work on or toward innovation-related targets in a variety of areas. Participants can include (among many others) managers, bankers, venture capitalists, professors, scholars, scientists, artists and government employees.

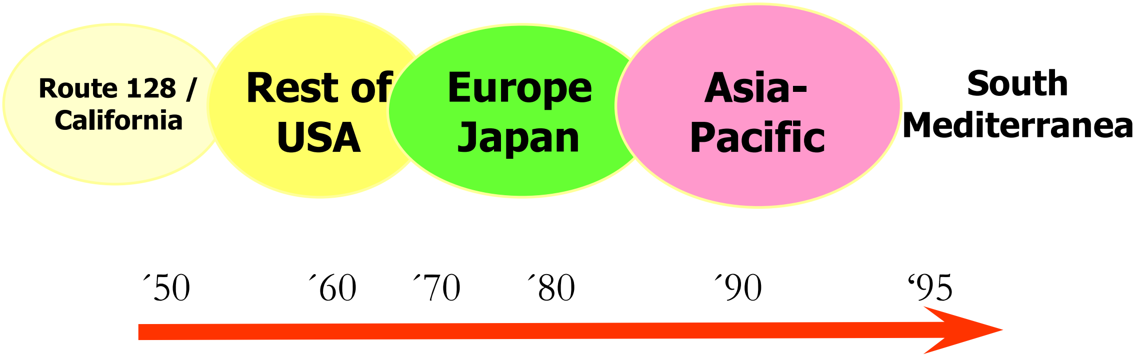
4.2.6 Hybrid Parks

There are technology conurbations that exhibit the characteristics of more than one type of conurbation identified above. These are typically mixed-use, private business parks that contain large established businesses, innovation networks, business incubators, university affiliations and R&D facilities. The Bishop Ranch Business Park in San Ramon, CA is an example of this kind of park.

4.3 Key Milestones in the Development of Technology Parks

Technology parks originated in the 1950's with the establishment of the Stanford Research Park in Palo Alto, California and the Research Triangle Park in North Carolina. As a matter of fact, one could argue that the origins of the technology park might be traced back to the establishment of Hewlett Packard, and ultimately Silicon Valley, in 1939. As a direct result of the phenomenal (subsequent) success of Silicon Valley and the Stanford Research Park, similar technological capacity and economic expansion initiatives have spread throughout the world in the form of new technology parks (and other similar vehicles). Figure 4-1 below is a general timeline illustrating the global expansion of the technology parks phenomenon, which is largely self-explanatory.

Figure 4-1 A Brief History of the Evolution of Technology Parks



Source: IASP 2002

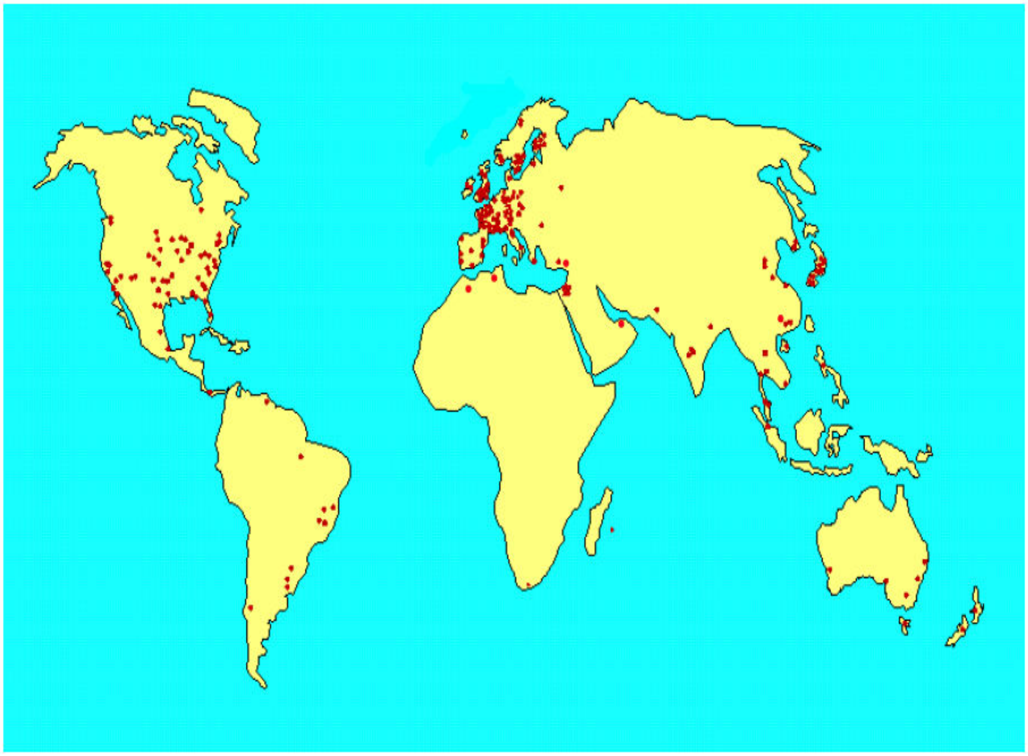
A brief history of the technology park movement is as follows:

- 1939 – Hewlett Packard (Stanford)
- 1951 – Stanford RP (US first)
- 1959 – Research Triangle Park
- 1960 – Pierre Laffitte = Sophia Antipolis in '74
- 1970's First Incubators
    - MATAM Science Center (Israel); Sophia Antipolis (France)

- 1980's Growth: 30% of Today's Parks
  - Park friendly policies: Israel, Japan
  - Technopolis Oulu (Finland)
- 1990's Growth: 48% of Today's Parks
  - India, Tunisia, Panama
- 2000's Growth: 18% to-date…Pace equals 1990's

The location of the world's leading technology parks that are members of IASP are provided in Figure 4-2 below. It can be seen that North America, Europe and Asia have the highest concentration of technology and science parks.

Figure 4-2 Global Technology Parks - IASP Members



Source: IASP

Technology parks worldwide are found in various settings including sprawling rural green spaces and "vertical" high-rise metropolitan parks. Technology parks within the United States tend to be larger the other parks around the world. For example, according to a publication called the "Venture Creation and Growth through Business Incubators and Technology Parks," by Rustam Lalkaka, the average US technology park covers 200 acres, includes over 200,000 square feet of buildings, has 12 tenant firms, approximately 300 employees and a $250,000 operating budget. In contrast, technology parks outside the United States tend to be smaller.

According to a 2001 report published by the United Nations Economic And Social Commission For Western Asia, titled "Technology Capacity-Building Initiatives For The Twenty-First Century In The ESCWA Member Countries," the top six science and research parks in the United States (including Stanford Research Park, Research Triangle Park of North Carolina, Charleston University Research Park, Metro Tech., Irvine Spectrum, and the Louisiana Biomedical and Development Park) accommodate up to 2,000 firms, employ up to 34,000 people, and have a work force range between 160 and 750 employees per firm.

By contrast, the top eight European parks (and technopoles) accommodate up to 2500 firms, employ up to 22,250 people, and have a work force range between 9 and 60 employees per firm.

The 1960s marked the decade when Pierre Lafitte dreamed of brining the creativity, culture, connectivity, and excitement of the French Latin Quarter to the countryside; an "International city of wisdom, science and technology on the French Riviera". In 1960, Lafitte wrote an article titled "Latin Quarter in the fields," which was published in the Le Monde newspaper. The vision was a major hub of art, education, innovation, and commerce outside the city limits of Paris. It was of a connection of skills to financial markets where the link between knowledge and industry, education, research and technology would create valuable innovations. At its beginning, the park was considered an innovative, daring, and risky endeavor. Nearly fourteen years later, in 1974, FRANLAB became the first company to set up operations on the site of what is known, today, as Sophia Antipolis. In addition, to serving as a premiere technology park, in France (which will be covered in more detail later), Sophia Antipolis also served as the 1984 birthplace of the International Association of Science Parks (IASP).

The IASP is an international non-profit organization that assists the development of new Science and Technology Parks, encourages partnerships among the various driving forces in science parks and

Incubators, and fosters international networking among its members. It is a non-profit organization that is financially self-sufficient and "bottoms-up" (member) focused. It currently has 277 members (parks, etc.) representing 62 countries and 55,000 tenant companies. Forty-two percent of the members represent private industry, eighteen percent are research institutions, and the remaining forty percent operate advanced service firms.

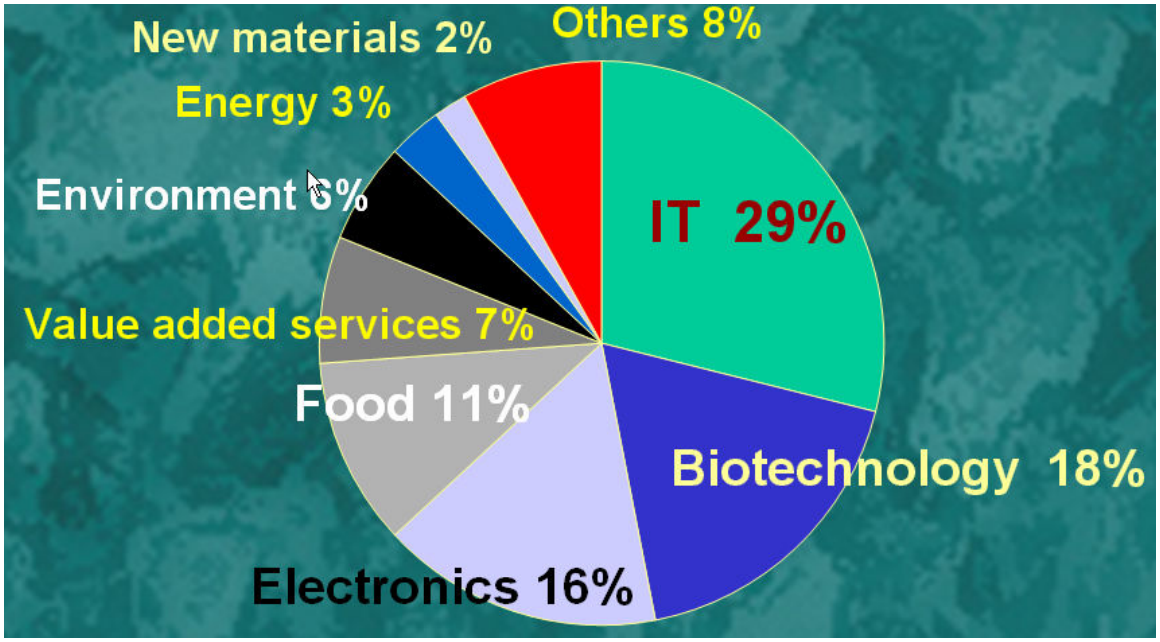
This is a contrast the mix of members from the Association of University Research Parks (AURP) which is another organization that is similar to the IASP. The AURP has approximately 350 members worldwide and a majority of them represent research-related activities.

Now headquartered in Malaga, Spain, the IASP has a branch office in Beijing, China and operates based on four divisions (Europe, Asia Pacific, North and Latin America). The types of organizations attracted to the IASP membership include the following:

- Science Parks, Technology Parks, Research Parks, and Technopoles, fully developed and operative or in their early stages of planning and development.
- Innovation-based business incubators, fully developed or under planning.
- Universities and High Education Institutions.
- Technology Institutes. Research Centers.
- Development Agencies.
- Economic development professionals.
- Technology transfer consultants and brokers.
- Experts and consultants in regional development, technology transfer, business creation and location, knowledge...
- In general, any institution, company or individual who shares some of the objectives of the IASP and is interested in the development of Science/Technology Parks or innovation-based Business Incubators

According to a study conducted by the IASP, the most dominant technologies in Technology Parks were Information Technology (29%), Biotechnology (18%), and Electronics (16%). This is shown in Figure 4-3 below.

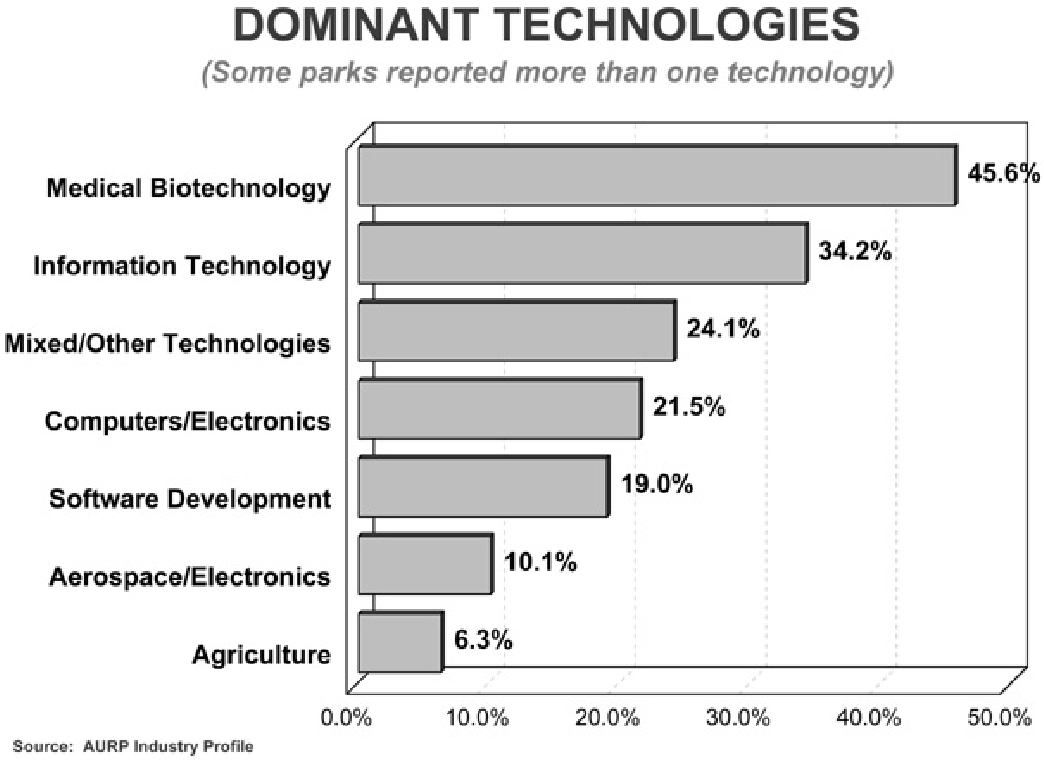
Figure 4-3 Dominant Technologies in IASP Member Parks



Source: IASP 2002

The technology focus of tenant firms in technology parks is quite different from those in University Research Parks. According to a 2003 study conducted by the AURP, the most dominant technologies represented by tenant firms in research parks were Biotechnology (46%), Information Technology (34%), mixed technologies (24%), Computer Electronics (21%), and Software Development (19%). This is shown in Figure 4-4 below.

Figure 4-4 Dominant Technologies in IASP Member Parks



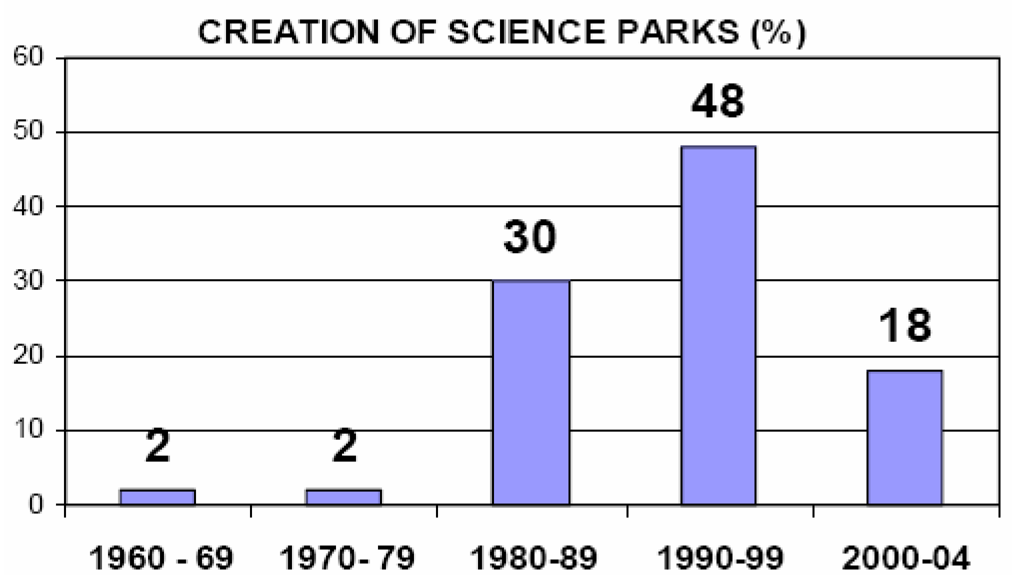
Source: AURP Industry Profile

The IASP study also indicates that 35% of tech park tenant firms employ five employees or less, another 35% employs between six and twenty employees, and only 6% employ more than one hundred employees. As many as 96% of the technology park tenants believe that being part of a technology park is important or very important to the success of their firm. There may be many reasons for this. For example, our study revealed that technology park management rates park location as the number one factor for park success. They also rated the quality and nature of technology park tenants as the number two factor for park success. Infrastructure, proximity to service firms (e.g. legal, financial, etc.), and prestige (e.g. Stanford Research Park) may also have an influence.

The IASP study also indicates that 58% of tenant firms in technology parks were already in existence when they joined, 27% joined the park at the point of firm creation, and the remaining 15% were either spun off or incubated within the park. This is important to the management organization that is in the process of establishing or expanding a technology park. While new firm creation is critical for sustained technology park success through firm life cycle renewal, marketing resources might best be directed toward attracting existing firms, to relocate to the park, from outside the park locality.

In terms of technology park expansion and industry growth, the 1980's and the 1990's represented the highest growth with a combined 78% of existing technology parks being established. An example of this growth is that the IASP membership has more than doubled since 1994. However, the rate at which new parks are being established, in the current decade of the 2000's, is ahead of that in the 1980's and on par with that of the 1990's. The growth trend of new parks continues to be robust. These relative growth comparisons are provided in Figure 4-5 below.

Figure 4-5 Relative Creation Percentage of Science Parks (1960-2004)



Source: Technological Parks' Competitive Environment (Masboungi, 2004)

According to a 2001 study conducted by Anne Theodore Briggs and Stephen Watt titled, "Technology & Research Parks, A Report Created on the Impacts of National Information Technology Environments on Business," some of the other important technology park milestones that occurred in the 1980's are as follows:

- **Early 1980's** - Israeli government passed legislation to encourage industrial research and development, including the distribution of grant money
- **1981** - Funding authorized for the Rensselaer Technology Park, to be operated in conjunction with Rensselaer Polytechnic Institute (Troy, New York)
- **1982** - University of Oulu partners with Finland's state-owned research and electronics center to create what would become Technopolis Oulu
- **1983** - Japan passes Technopolis Law. "The purpose of this law was to erect major incubators of original technologies under the keen international competitions, not only in the dominant metropolitan areas but also in the frontier areas of Japan."
- **1984** - National Technological Park founded in Limerick, Ireland
- **1991** - India establishes Software Technology Parks of India

4.3 Factors Affecting Technology Park Success

There are over 500 Science and Technology parks worldwide. Approximately 35% are located inside the United States, 50% are split evenly between Japan and China, and the remaining 15% are scattered throughout the rest of the world. Some have been successful and some have only been marginally successful. Strong, cooperative bonds (especially those that lead to close collaboration) between the institutions and parties involved, in these initiatives, is a key factor in achieving success. Government involvement (such as Government commitment and leadership to drive industry development and extensive Government-business collaboration to drive technology development and diffusion) is an important ingredient for park success.

Professors Manuel Castells and Peter Hall studied the global efforts of systematically attempting to promote and harness the type of technological capacity-building and creativity we referred to earlier. They also refer to the technology park as one of four types of technopoles (a place where technology and city become integrated as one). While each of the technopole designs has their advantages, Castells and Hall conclude that none have been found to be universally successful. The most successful example, and perhaps the most admired and imitated, is that of the Silicon Valley. Castells and Hall refer to Silicon Valley as an Industrial Complex or technology cluster. The region is renowned as the birthplace of the microchip and personal computer industries.

Technology parks seek to attract companies, varying in size and establishment, to cluster together in an effort to boost regional economic growth through job creation, and related industry expansion. However, it has been revealed that technology parks have not been successful at generating breakthrough innovation or related consumer integration and adoption. Despite the various tax breaks, reduced rent incentives and publicly funded infrastructure, to persuade successful, established firms and promising upstarts to work together, there is often the missing ingredient of private and public collaboration. Perhaps one issue results when large, so called, tenant firms locate into the park. In many cases, the branch facility ends up operating independently of its parent operation. The result is not meaningful commitment from the anchor firm and no true innovative collaboration.

By default and because of its enormous success, Stanford Research Park and Silicon Valley has become a success model for technology parks and clusters around the world. In the book, "Regional Advantage: Culture and Competition in Silicon Valley and Route 128," Saxenian writes that it is not enough to just come up with a "wining formula" for the success of certain cluster or technology park. Though many regions throughout the world have tried and continue to try and duplicate it, the successful formula of Stanford Research Park and Silicon Valley cannot be simply duplicated by a copy-exact approach. In a 1998 InfoWorld article, Robert. Metcalfe states, “Silicon Valley in the only place on earth not trying to figure out how to become Silicon Valley.” Porter states that regions that leverage “their unique mix of assets,” become successful. This requires coordination and collaboration between the private and the public stakeholders. Stanford Research Park’s and Silicon Valley’s success can be attributed to many regional assets (competitive advantages) such as a large technical talent pool, preexisting infrastructure, easy access to venture capital sources, supply networks, access to world-class educational facilities, etc. (see Amirahmadi and Saff, 1993; Lee, Miller, Hancock and Rowen, 2000).

A shared economic vision and the right mix of government participation (through policies, etc.) are important to park success. Porter believes true regional technological success is driven primarily by the regional and local governments not the federal government, although, federal government agencies and institutions have a role to play. For example, Porter indicates some of the specific areas where federal involvement and policy can be value-added. Increasing federal funding for research initiatives, policies encouraging investment in science and technology infrastructure, support for science and engineering training, strong intellectual property protection policies, strong anti-trust legislation, and the encouragement of regional economic development (at the state and local level) are just a few of the examples. Porter also points out that, in general, governments can help with the strategic or architectural planning for regional economic development.

According to Saxenian, by comparing Route 128, and, Silicon Valley it is suggested that it is not enough for an industry to benefit from the aggregation effects, it is critical to be able to respond to fast-changing markets and technologies as well as the social and institutional setting to promote innovation as the technology landscape changes. Regional players must always be looking forward. Government entities, institutions, departments, universities and other research and development institutions tend to take a long-term approach to S&T capacity-building initiatives and solutions. In contrast, private sector stakeholders, due to limited resources and tendencies to invest more of those limited resources on the immediate issues may tend toward short-term initiatives in order to maximize short-term profits.

In general, a short-sighted strategy, or one that ignores adequate long-term planning will almost surely lead to an untimely demise. While some parks are created and managed by government agencies or institutions most involve public and private partnership. Such a successful partnership can result in both achieving their respective goals. The park developers receive a return on their investment and governments achieve regional economic and industry development objectives. This situation is an example where the long-term, strategic vision of governments can compliment the dynamic nature of private enterprises in order to optimize capacity-building initiative results.

Michael Porter, in his publication, "Clusters of Innovation: Regional Foundations of U.S. Competitiveness," acknowledges that governments (at all levels) exert significant positive and negative influence on regional business environments. According to Porter, regional infrastructure (both physical and informational) is important to establish and extend regional economic prosperity. Roads, highways, airports, railroads, water and power must be of good quality in order to improve quality of life and ensure conveyance of people, goods, and services. When is comes to a labor and talent pool, Porter favors quality over quantity.

The availability of (expensive) specialized talent is more important than the mere abundance of (low cost) labor. The specialized talent pool must be local, however can be homegrown or attracted from outside geographies. A strong educational system provides the homegrown portion of the talent pool. Porter emphasizes that a quality K-12 educational system is becoming more critical to establish a talent "baseline." Porter also points out the importance of Universities and specialized research centers in driving innovation. He states that although companies and individuals continue to contribute substantially to the creation of innovation, Universities and specialized research centers ensure a steady flow of ideas in almost every economic region.

In their 2003 publication, "An Analytical Framework for Science Parks and Technology Districts with an Application to Singapore", Koh, Koh, and Tschang indicate that governments exert much influence on policies related to the funding of research institutions, like Hsinchu's ITRI, Cambridge University, and the early defense firms in Silicon Valley. However, Asian governments used a strategy focused more on the provision of high-quality infrastructure in order to attract foreign direct investment (FDI) from multinational corporations (MNCs).

Hsinchu used its high-quality infrastructure to develop national capabilities in the manufacture of high-tech products. Certain enablers were placed into service to facilitate knowledge transfer from research institutions to the private sector

This was the case in Malaysia, Thailand and Singapore, where the development of science parks was an important part of the efforts to attract foreign investment. Governments can signal their commitment to technological capacity expansion by establishing a science and technology park. Though a park may have some less-than-optimal characteristics, such as infrastructure, collaborative linkages, etc., the parks advantages can be strengthened with the influx of FDI (as the park attracts MNCs and other firms from neighboring regions). This strategy was more prevalent in the Asian economies.

As mentioned above, there is no single strategy that is perfect for every global region. Silicon Valley's success originated partially from its transformation into a world-wide R&D center. Hsinchu fed off of Silicon Valley's success by connecting with its extended global network. Cambridge has used its world-class facilities to attract technology start ups. All chose different paths to focus on, however each had certain commonalities. For example, each had access to specialized talent, and, as we know (from Porter) it is the "specialized" talent that matters not the abundant low-cost labor. The common output (or one of them) was the ability for all three examples to generate park growth. The growth took the form of a steady flow of innovation, new technological transfer, extension of products into global markets, creation of new firms, etc.

Hsinchu provides an interesting contrast to Cambridge and Silicon Valley. A primary motivation in its establishment was to provide high-quality infrastructure to support technology startups and help.

4.4 Global Technology Park Best Practices

Based on our exhaustive review of the literature on technology parks worldwide and our focused search for the best practices and success factors of the key parks in the major regions of the world, our team was able to synthesize our findings about the best practices utilized by these parks based on this park-specific literature and other park-specific sources on the Internet. In order to organize the findings in a systematic manner, we decided to summarize the major findings regarding best practices under the rubric of our GLOINTECH Model. The major findings are presented below:

4.4.1 Factor Conditions – Features and Best Practices

The following were some of the major findings of our extensive survey of the extant literature that we conducted with regard to the best practices on the factor (input) conditions variable (findings for the other variables follow):

- A high quality of infrastructure was provided by all the successful parks and deemed important for long-term success. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- A key role in successful technology park development is played by the availability of capital (traditional bank finance, venture finance and government finance) in the start and continuing operation of the park. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Knowledge intensity and a high quality mobile labor force constitute the best practice for park success. Successful parks such as Stanford Research Park, Research Triangle Park, the Oulu Innovation Park, and Hsinchu Technology Park all demonstrate the importance of this success factor. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- There is a key role for universities and research institutes, particularly for science and technology parks. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- A specialized business infrastructure is very important for park success. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- It is a pervasive feature of technology parks that the majority of jobs in the surrounding region are not high tech. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001).

4.4.2 Demand Conditions – Features and Best Practices

- Spatial concentration is ineffectual without market-driven activity so that successful parks are demand driven. (Technopoles of the World: The Making of 21st Century Industrial Complexes - Castells and Hall, date and Building High-Tech Clusters: Silicon Valley and Beyond - Bresnahan and Gambardella ed., article by Anna Lee Saxenian, 2004; Regional Advantage: Culture and Competition in Silicon Valley and Route 128 - Saxenian, 1996; and Silicon Valley North: The Formation of the Ottawa Innovation Cluster - ITAC, 2002).

- Location in a successful cluster is very important from a local demand creation point of view. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001).

- Due to its infrastructure, demand conditions, large labor pools and quality of life, established city environments favor tech park development. (Technopoles of the World: The Making of 21st Century Industrial Complexes - Castells and Hall, date and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001).

4.4.3 Related and Supporting Industries – Features and Best Practices

- The emergence of support ecosystem leads to a spill over effect that is beneficial to both the primary firms and their suppliers and supporting firms. This leads to a positive spiral of beneficial agglomeration. (Building High-Tech Clusters: Silicon Valley and Beyond - Bresnahan and Gambardella ed., 2004 and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

- The availability of business services (legal, accounting, finance, trade etc.) to serve the primary firms in the park is critical to for technology park success. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Industry-interactive institutes and universities contribute to science/technology park success. (The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

4.4.4 Firm Strategy, Structure and Rivalry – Features and Best Practices

- Intense competition and cooperation in clusters and technology parks spurs innovation. (Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998 and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

- The presence of competitors, suppliers and complementors is important for the success of the cluster or technology park. (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002)

4.4.5 Business Climate – Features and Best Practices

- An open business environment is very critical to cluster and technology park success. . (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002 and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Successful parks and clusters exhibit business, government and non-profit collaboration. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001 and Building High-Tech Clusters: Silicon Valley and Beyond - Bresnahan and Gambardella ed., 2004).

- A risk-taking and failure tolerating climate tends to characterize successful clusters and technology parks. (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002 and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Private property law enforcement and the adherence to business law rules creates an environment for technology park and cluster success. (Building High-Tech Clusters: Silicon Valley and Beyond

- Bresnahan and Gambardella ed., 2004 and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

4.4.6 Socio-political Climate – Features and Best Practices

- A high quality of life with the availability of all the modern amenities and opportunities for highly skilled individuals provides for technology park success. (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002; Intelligent Cities – Komninos, 2002; and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- The key role of political stability and low crime/corruption is emphasized. (From Silicon Valley to Singapore – McKendrick, Doner and Hagard, 2000)

4.4.7 Existence of Inter-firm Linkages/Connections – Features and Best Practices

- Networks in and between clusters/tech parks matter for attracting firms and retaining them in the cluster or technology park. (Building High-Tech Clusters: Silicon Valley and Beyond (Bresnahan and Gambardella ed., article by Anna Lee Saxenian, 2004; Regional Advantage: Culture and Competition in Silicon Valley and Route 128 - Saxenian, 1996; and Silicon Valley North: The Formation of the Ottawa Innovation Cluster - ITAC, 2002)

- Successful tech parks are inter-dependent and multi-entity with strong linkages and connections between the firms in the park. (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002; Information Technology Parks of the Asia pacific - Jussawala and Taylor, 2000; and From Silicon Valley to Singapore – McKendrick, Doner and Hagard, 2000)

- Global linkages and connections are very important for specialization and success. (From Silicon Valley to Singapore – McKendrick, Doner and Hagard, 2000; Outlook - Joint Venture Silicon Valley Network, 2000; Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998 and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

4.4.8 Agglomeration Effects – Features and Best Practices

- Agglomeration effects are critical to cluster/tech park development. (Silicon Landscapes - Hall and Markusen ed. article by Ray Oakley,1985 and The Oxford Handbook of Economic Geography - Clark, Feldman and Gertler ed., article by Michael Storper, 2000)

- Planned/induced concentration does not drive regional development or tech park success (Technopoles of the World: The Making of 21st Century Industrial Complexes (Castells and Hall, date and Building High-Tech Clusters: Silicon Valley and Beyond - Bresnahan and Gambardella ed., article by Scott Wallsten, 2004)

- Determinants of competitive advantage are inter-linked and self-reinforcing. (Cloning Silicon Valley: The Next Generation High-Tech Spots – Rosenberg, 2002; Intelligent Cities – Komninos, 2002; and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Cluster success concentrates in a few sub-clusters (parks). (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

4.4.9 Government/Public Policy – Features and Best Practices

- Government role in cluster/park development includes:
    - Development of advanced and specialized factors
    - Focused science and technology policy
    - Regulatory reform
    - Attraction of Foreign Direct Investment (FDI)
    - Export promotion
    - Collection and dissemination of economic information

(Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998; and Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

- Governments have a significant positive or negative influence on the business environment and consequently on cluster and technology park success. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

- Local government and government agencies can be a bottleneck to cluster/technology park development and need coordination within themselves and with state/federal government. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

- Government involvement is important for park success. In terms of:
  - Commitment and leadership (e.g. drive industry development)
  - Extensive Government-business collaboration for technology development and diffusion

(Advising and Monitoring the Planning of a Technology Park: Guidelines for an ICT Park in Iran - United Nations Industrial Development Organization, 2005)

4.4.10 Element of Chance - Features

- There are a number of uncontrollable factors that are the result of pure luck over which the technology park authorities have no control. (Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998; Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001; Understanding Silicon Valley – Kenney, 2000; and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

- Reputation, location and roots of firm founders in the region are all chance factors that may have a very important impact on cluster/park success. (Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998; Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001; Understanding Silicon Valley – Kenney, 2000; From Silicon Valley to Singapore – McKendrick, Doner and

Hagard, 2000 and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

4.4.11 Innovation and Entrepreneurship – Features and Best Practice

- The ability to foster a results-oriented meritocracy was critical for the success of Silicon Valley/Stanford Research Park and Hsinchu Science Park.- (Bresnahan and Gambardella ed., 2004; Regional Advantage: Culture and Competition in Silicon Valley and Route 128 - Saxenian, 1996; The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000; and Silicon Valley North: The Formation of the Ottawa Innovation Cluster - ITAC, 2002)

- The ability to foster new firm creation is "critical" to the long-term success of technology parks. (Building High-Tech Clusters: Silicon Valley and Beyond -Bresnahan and Gambardella ed., article by Anna Lee Saxenian, 2004), Regional Advantage: Culture and Competition in Silicon Valley and Route 128 - Saxenian, 1996; and Silicon Valley North: The Formation of the Ottawa Innovation Cluster - ITAC, 2002)

4.4.12 Anchor Firms - Features and Best Practice

- Anchor companies are important to cluster/tech park development because of their ability to attract other firms, the spin-offs they generate and the quality of life impact of their presence in the park. (Clusters and Competition: New Agendas for Companies, Governments and Institutions, Chapter 7 in On Competition - Porter, 1998; Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001)

4.4.13 Historical Factors - Features

- Long-standing links between firms are very supportive of technology park success. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001 and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000; and Silicon Valley North: The Formation of the Ottawa Innovation Cluster - ITAC, 2002)

- The historical presence of key firms acts as a spur to park development. (Clusters of Innovation: Regional Foundations of U.S. Competitiveness - Porter, 2001 and The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship - Lee, Miller, Gong-Hancock and Rowen, 2000)

From this brief analysis of the large literature on clusters and technology parks worldwide, it can be seen that there is supporting evidence regarding each one of the elements of the GLOINTECH model and there are specific features and best practices to draw upon in building a world-class technology park. Next, we briefly review the role, structure and features of technology parks in the major regions of the world.

4.5 Role and Features of Technology in Major World Regions

One of the major research objectives of this study was to understand the best practices and KSFs/KFFs of technology parks in the major regions of the world so as to understand the success/failure factors within the specific context of different development situations. The GLOBUSTRAT team adopted a strategy of looking at the principal technology parks on four major continents and to pick at least two parks, one successful and the other unsuccessful, in order to understand the key KSFs and KFFs of technology parks in each region.

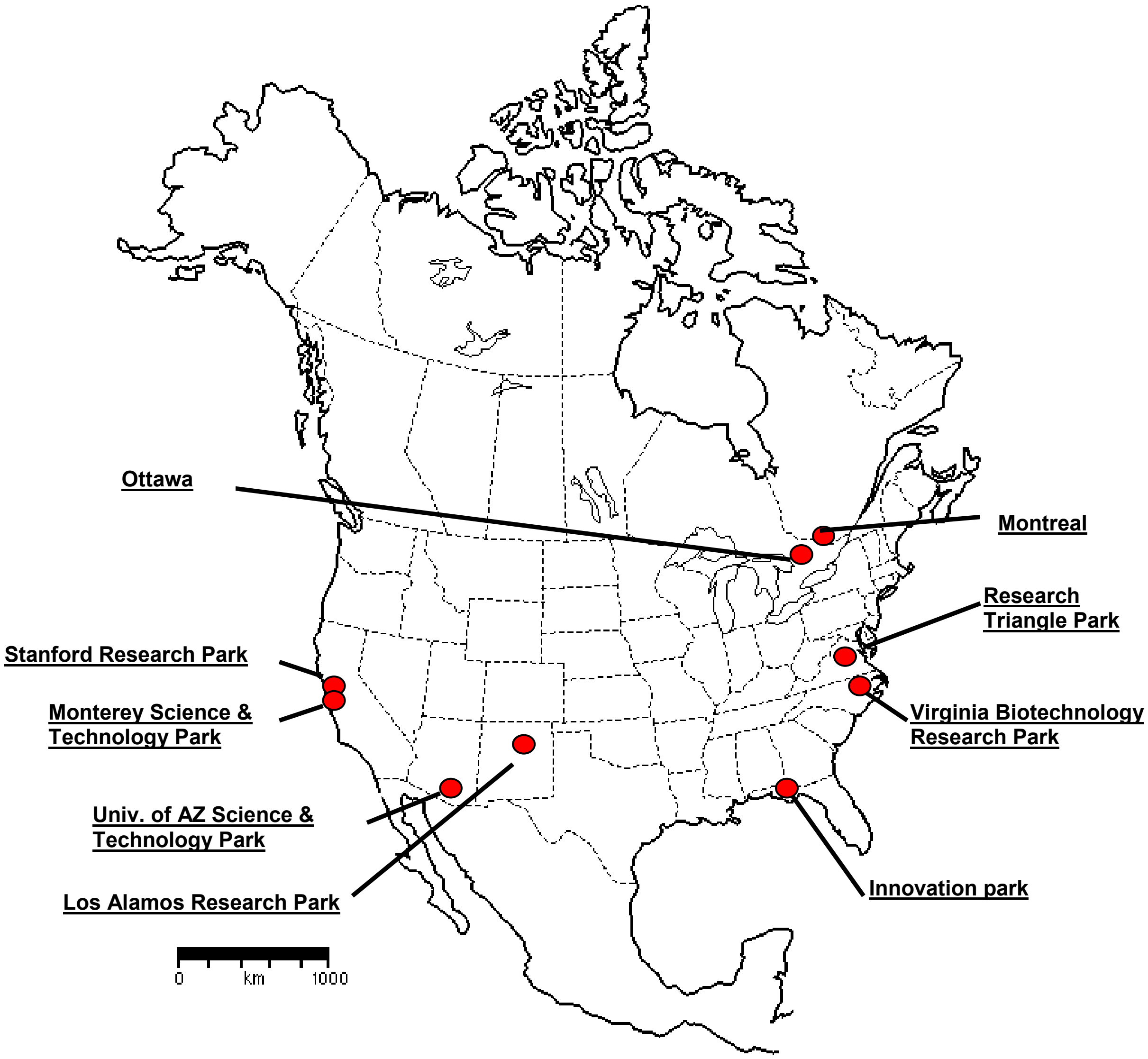
A second major research objective was to provide Sapiens Parque management with the profiles of major technology parks worldwide. This section provides information to meet both objectives. Appendix 1 contains the park profiles developed by the members of the team and are self-explanatory. We summarize in this section the major lessons learned from the detailed study of these parks.

Ratter than provide a detailed description of the major features of each park, we summarize the major features in terms of brief self-explanatory sentences and provide the pertinent references for the interested reader to access the sources and read a complete description of the features and issues identified.

4.5.1 North America: Technology Park Overview

Figure 4-6 below provides a map and the locations of the technology parks in North America that were studied by the GLOBUSTRAT team. The discussion that follows highlights the main features and best practices that were revealed by the detailed examination of these parks and discussion with park management in some cases.

Figure 4-6 Technology Parks Studied in North America



Source: http://www.geo.ucalgary.ca/~macrae/maps/North_America.gif

The major features and best practices that emerged from this study of technology parks can be summarized in the following brief points:

- Most research, science and technology parks are built in association with universities (Luger and Goldstein, 1991)
- Contributions to science and technology park success:
    - Social and economic networks and linkages (Saxenian, 1996, and Porter, 1998)
    - High quality of life and a mobile work force (Florida, 2002, Pinkowski, 2005, Sanz, 2003, and http/technpark.ir/parks/English/Articles/PDF/Paper14.htm)
    - Transportation and technology infrastructure (Pinkowski, 2005)
    - Culture of innovation and risk taking ((Lee, Miller, Gong-Hancock and Rowen, 2000 Article by Kvamme, and Pinkowski, 2005)
- Success factors of select parks (i.e. Stanford, RTP, Route 128, Ottawa) :
    - Large pool of technical talent
    - Strong local and international demand
    - Availability of preexisting infrastructure
    - Large network of suppliers
    - Access to venture capital
    - Access to top educational facilities and research institutions
    - Access to well-developed information networks
    - Favorable and open business climate
    - Results-oriented meritocracy (risk-taking rewarded and failure tolerated)

  - Large pool of entrepreneurs1

(Amirahmadi and Saff, 1993, and Lee, Miller, Hancock and Rowen, 2000)

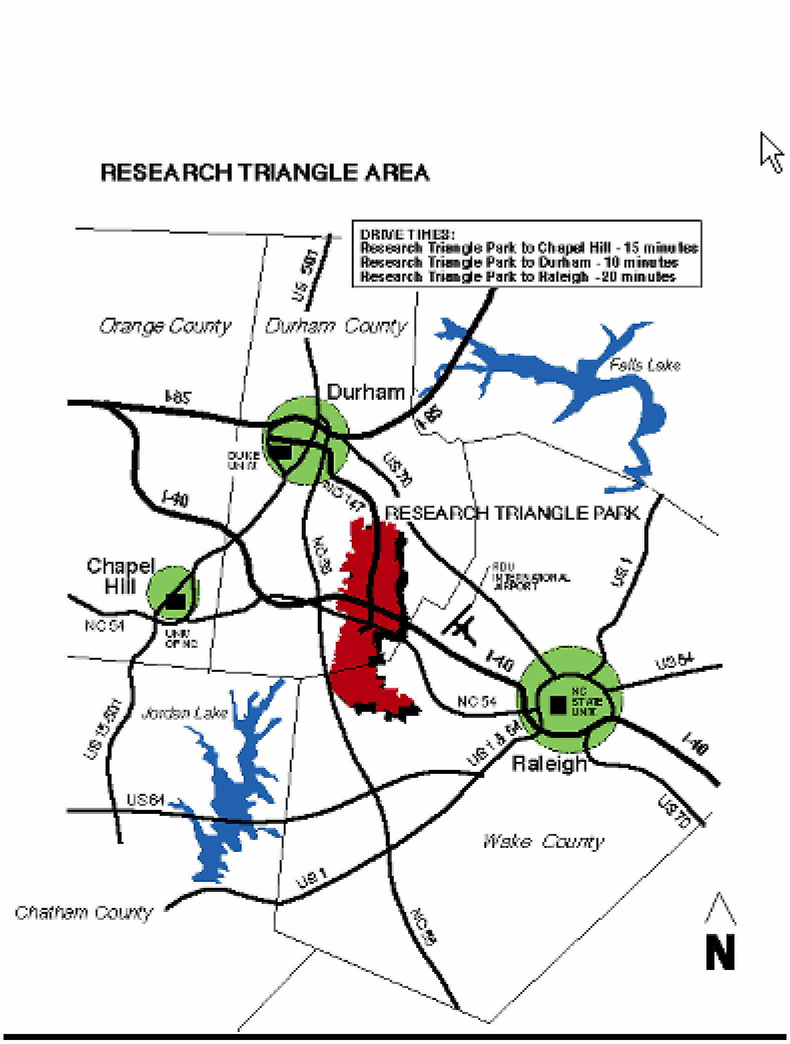
- Collaboration between business, academic and public resources have been most helpful for tech park success (Pinkowski, 2005, Lee, Miller, Gong-Hancock and Rowen, 2000 Article by Henton)
- Many science and technology parks coordinate with private high-tech firms (Pinkowski, 2005, Lee, Miller, Gong-Hancock and Rowen, 2000 Article by Henton)
  - (e.g. Sandia, Oak Ridge and Los Alamos Labs)
- Supporting institutions and ancillary services necessary for tech park success (Kenney, 2000 Articles by Kenney and von Burg and Kenney and Florida , and Pinkowski, 2005)
- Government has been supportive and facilitating not directive or interventionist (Porter, 1998, Porter, 1990, and ITAC, 2002)
- Successful U.S. and Canadian clusters are organic. (Porter, 1998, ITAC, 2002)

The main points of our case study of two parks are summarized below:

4.5.1.1 Case Study 1: Research Triangle Park, North Carolina

Research Triangle Park (RTP) is a public/private, planned research park, created in 1959 by leaders from business, academia and industry. But the idea of creating a research park started many years before. Many people in the 1950s started thinking about the concept of a research park including Howard Odum, professor of sociology at the University of North Carolina at Chapel Hill. In 1952, Odum proposed several research center formats that incorporated the idea of cooperation among research organizations. Romeo Guest was another person who was extremely involved with the idea of forming a research park. Guest was one of the first people to use the phrase "Research Triangle Park." Figure 4-7 below provides a map of the Research Triangle Park.

Figure 4-7 Research Triangle Park



Source: www.rtp.org

This 7,000 acre research park is conveniently located near three major research universities: Duke University in Durham, North Carolina State University in Raleigh and University of North Carolina at Chapel Hill. It is eight miles long and two miles wide. There is an excellent quality of life in the Triangle, with lower housing costs, excellent educational system, a variety of dining, outdoor activities and entertainment and an excellent business climate. There are currently 1,100 acres in RTP that are still available for development. Approximately 99.4 % of employees work for R&D related organizations and almost 40% of Park employers have less than 10 employees.
Figure 4-8 below shows the park's growth over the last 43 years.

Figure 4-8 Population Growth for the Last 43 Years

Year	**# of R&D Companies**	**# of Service Companies**	**Developed Sq. Footage**	**# of Employees**
1960	3	1	204,000	500
1965	8	2	384,645	908
1970	20	6	2,396,512	8,000
1975	23	26	2,827,412	10,400
1980	40	33	6,468,912	17,500
1985	54	55	10,440,582	26,000
1990	66	47	11,620,000	32,500
1995	97	39	14,345,900	35,000
2000	106	35	15,500,700	44,000
2001	109	35	18,496,510	42,000
2002	100	35	19,125,842	38,500

Source: www.rtp.org

Figure 4-9 below shows recent income statistics in the three counties surrounding the Research Triangle.

Figure 4-9 Income in the Triangle

County	Per Capita	Population
Wake	$35,864	719,520
Durham	$31,129	239,733
Orange	$34,182	117,515
	(2003 figures)	(2004 figures)

Source: Bureau of Economic Analysis and US Census

Our assessment of the success of the Research Triangle Park is that is has been a successful technology park. It has directly created an estimated 38,500 full-time jobs over the past 43 years. If you include contract labor, the number increases to about 44,000. The average salary of an RTP employee is $56,000 and the average income in neighboring counties is $33,000. Over 1,956 patents have been created in the state of North Carolina, and the number over patents per 1000 individuals in scientific and engineering occupations is 20.9. The Research Triangle Park is an example of the successful, spontaneous development of a technological park. North Carolina ranks as the #4 highest State technology investment region in U.S. compared to the Virginia Biotechnology (less successful park) which ranks only 17th. The Research Triangle Park has attracted > $2 Billion Capital investment and the local universities attract nearly $2 Billion annually for R&D.

4.5.1.2 Case Study 2: Virginia Biotech Park, Virginia

The Virginia Biotechnology Center was funded by a $5 million statewide bond referendum. The Virginia Biotechnology Research Park Corporation is an IRS Code Section 501(c) (3) corporation organized exclusively for scientific, educational, and charitable purposes, and hence exempt from taxation. The Research Park Authority is responsible for operating, managing and maintaining the park properties including oversight of sub-contractors. VCU’s Real Estate and Foundation Services Department provides accounting guidance, support, and oversight of the Authority’s financial statements and transactions.

Richmond is located between two acknowledged East Coast bioscience clusters: Baltimore-Washington and Research Triangle. The Virginia Biotechnology Research Park is an attempt to position the Richmond area as the new center for biosciences by leveraging the region's attributes as a location for traditional industries, high-technology companies, and entrepreneurship and business services. Established in 1996 as a partnership between Virginia Commonwealth University, the city of Richmond and the commonwealth of Virginia, the park is home to a mix of more than 50 bioscience companies, research institutes affiliated with the VCU Medical Center and major state and national medical laboratories and organizations involved with forensics, testing of biotoxins and management of the nation's organ transplantation process. Figure 4-10 below provides a map of the Virginia Biotechnology Research Park.

Figure 4-10 Virginia Biotechnology Research Park.

Source: http://www.vabiotech.com

There are over 1,350 scientists, researchers, engineers and technicians employed in the research park within 575,000 square feet of space in 8 buildings. Virginia Commonwealth University (VCU) is ranked by the Carnegie Foundation as a Doctoral Research - University Extension, and several of VCU's graduate and professional programs have been ranked by U.S. News and World Report as among the best in the nation. Other universities nearby include Virginia Polytechnic Institute and State University, University of Richmond and Virginia State University. MCV's Dept of Pharmacology and Toxicology ranks in the top 10 of NIH funded Pharmacology and Toxicology programs.

Virginia's corporate income tax rate has been a stable 6% since 1972. There is no local corporate income tax and at a 4.5% total rate, Virginia's sales tax rate is the 7th lowest in the country. Broad sales tax exemptions for business include all purchases used directly in production - gas, electricity or water delivered through mains, lines or pipes; and custom computer software.

Our assessment of the success of the Virginia Biotechnology Research Park is that it appears to have been lees successful than other similar parks such as the Research Triangle Park in North Carolina. Virginia Biotechnology Research Park has had positive cash flow from operating activities during each of the last 3 years of operation, but has not yet achieved its goal of establishing its immediate region as a center for biosciences. Per a study carried out by the Milken Institute in June 2004, the biotechnology clusters in San Diego, Boston and Research Triangle continue to assume the premier positions. The following are some factors that may have prevented the Virginia Biotechnology Research Park from achieving its objectives:

- Competition from successful biotechnology clusters in the Research Triangle and Washington DC, both in close proximity.

- Lack of a history of tradition and expertise in biotechnology related sciences. For instance, Boston and Philadelphia go back two centuries while the Virginia Biotechnology Research Park only goes back about twenty five years.

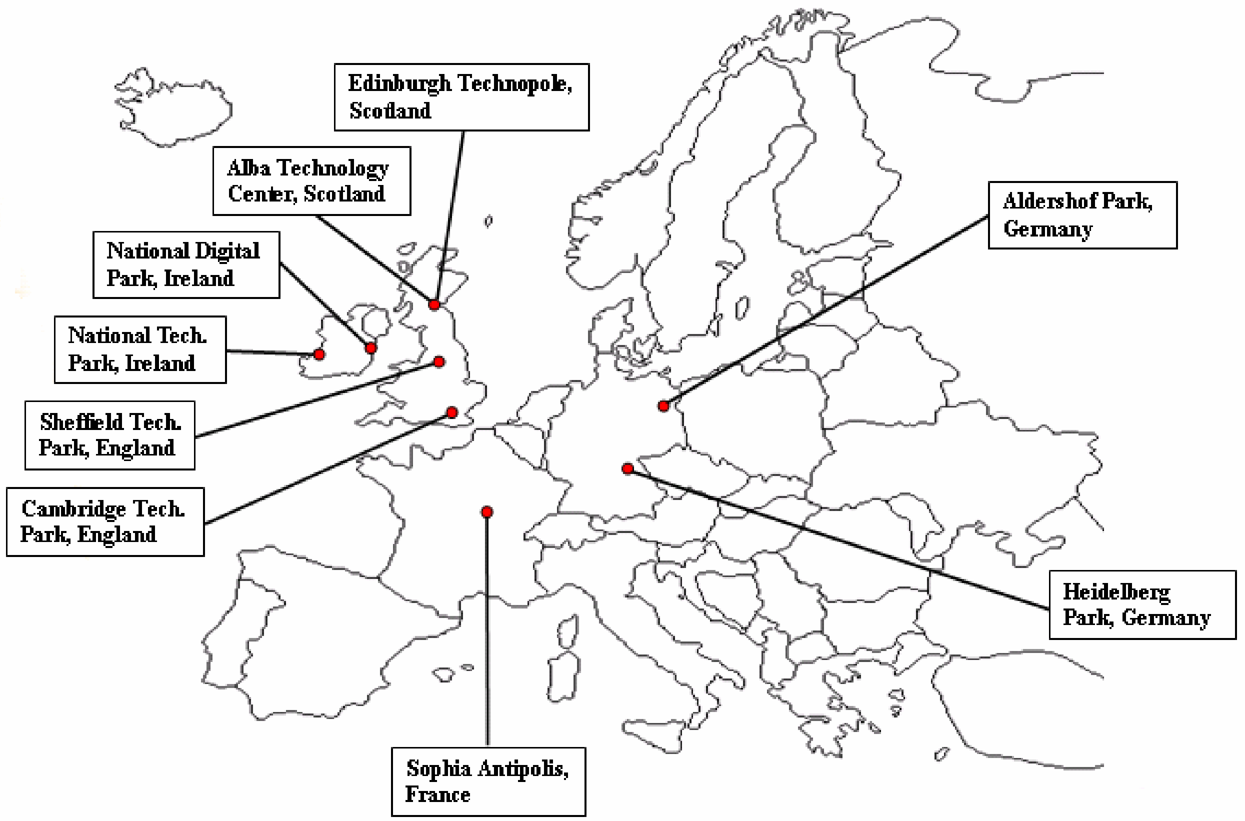
- Lower biotech human capital capacity than its competitors as measured by per capita biotech postdoctoral fellowships awarded, biotech scientists and biotech bachelor degrees awarded, and the percent of biotech bachelors degrees among all bachelors degrees awarded.

- Dearth of eminent life sciences scholars and research teams that could attract research funding.
- Lack of specialized facilities and services in the park that would afford bioscience companies the opportunity for collaboration and commercialization of their research.

4.5.2 The European Union (EU): Technology Park Overview

Figure 4-11 below provides a map and the locations of the technology parks in the European Union that were studied by the GLOBUSTRAT team. The discussion that follows highlights the main features and best practices that were revealed by the detailed examination of these parks and discussion with park management in some cases.

Figure 4-11 Technology Parks Studied in The European Union.



Source: adapted map from http://www.enchantedlearning.com/geography/europe/outlinemap/

The major features and best practices that emerged from this study of technology parks can be summarized in the following brief points:

Science and technology parks in the EU use either a property-led (France, Spain), technology-led (Greece, Italy) or a cluster-based (Germany, Sicily) park strategy.

University links between science and technology parks in the EU were lower than in the U.S. with 41% of on-park companies with such links in UK. [1]

The major success factors for science and technology parks in the EU are based on economic factors, i.e.:

- Accessibility of the region
- Markets that are located nearby
- Incentives and aid offered to companies
- The national/regional regulations for FDI [1]

In the U.K., there is a significant increase in science park provision from the private sector with a declining proportion from local authorities, universities and tenants. [2]

The most important single factor affecting technology park performance in the U.K. is the state of the sub-regional knowledge economy/cluster operated within. [2]

Market-creating and facilitating public policy has played a critical role in development of technology parks/clusters. [2]

In the case of the Cambridge High Technology Cluster and associated technology parks, there were no government policies to help.[3]

Both local and international demands were critical for Western European and Scandinavian technology park success. [2, 3]

A lack of a culture of innovation and risk taking has been a hindrance to European technology park and cluster success. [4]

The success of selected parks (i.e. Cambridge Science Park, Adlershof Technology Park, Sophia Antipolis, and Oulu Technology Park) can be attributed to a number of factors:

- Large pool of technical talent
- Availability of preexisting infrastructure
- Access to top educational facilities and research institutions
- Access to well-developed business networks
- Access to finance
- Substantial pool of entrepreneurs [5, 6]

The major factors hindering success at other technology parks in the EU region include:

- Excessive non-market driven government intervention/support
- Lack of an entrepreneurial culture
- Conservative finance capital
- Concentration of technological resources in core regions [4, 6]

The main points of our case study of two parks chosen from Germany are summarized below.

4.5.2.1 Case Study 1: Adlershof Technology Park

The Adlershof Technology Park is located in southeast Berlin. Its site originally hosted the German Aeronautical Research Institute in the 1930's.

Development on this park began in 1991. The park is managed by Wista Management GMBH and is the world's 15th largest science and technology park.

Figure 4-12 below shows the plan view of the park. The science and technology park site is 81 hectares in size and forms the core of the larger 420 hectare Adlershof City of Science, Technology and Media. The park is close to Schönefeld Airport.

Figure 4-12 Plan View of Adlershof Science and Technology Park.

Source: http://www.adlershof.de/fileadmin/downloads/anfahrt/oplan_kompl_2005.pdf

The park has a diversified focus in different industry sectors including in the main, New Materials, Optical Technologies, Information and Communication Technology, Environmental Research and Biotechnology.

The park boasts a large pool of technical talent with 10,000 technical staff (increased from 3200 in 2003) working in 650 resident businesses (increased from 365 in 2003) and 18 research establishments (increased from 12 in 2003). There is a substantial pool of entrepreneurs.

This park is a collaboration of university facilities, non-university research and an economic corporation. There is very good availability of pre-existing infrastructure, with strong professional management and comprehensive business support services. This includes the Innovation and Business Incubation Center (IGZ). Together these support services promote the enhancement of the technical and organizational infrastructure. The park offers access to well developed business networks, and top educational facilities and research institutions, including close ties to the Humboldt University of Berlin.

The park has good access to finance, including venture capital, private equity & financing available along with the research grants from the public and non-public research institutes.

The park is in attractive area of presence for EU and international companies and offers strong marketing packages to attract companies.

In conclusion Adlershof Technology Park is a successful park that is strongly marketed, situated in an attractive area of the EU for investment, with a large "specialized" talent pool, diversified focus, an entrepreneurial culture, and good infrastructure, business and financial support services.

4.5.2.2 Case Study 2: Heidelberg Technology Park

The Heidelberg Technology Park is located near the town of Heidelberg in southern Germany

The park was founded in 1985 and is owned and managed by Sparkasse Heidelberg. It was the first Biopark in Germany.

Figure 4-13 below shows an aerial photograph view of the park. The technology park site is relatively small at 3.7 hectares. The park is located close to Frankfurt Airport.

This niche park has a very specialized focus on Life Sciences and Biotechnology, and on developing Biotechnology Building Blocks. The park is heavily involved in leveraging intellectual capital from the nearby University of Heidelberg. There is a large dependency on university-based life-science research projects and translating academic research into commercialized ventures in order to sustain success. However, the extensive intellectual capital contributes value towards the success of the park. This illustrates the very close relationship between biotech parks and university/research centers in Germany.

The park has a comparatively small talent pool of 1000 specialized staff working in 63 resident companies that utilize 50,000 square meters of lab and office space. There is a reasonable level of pre-existing infrastructure and limited access to well developed business networks.

Comparatively there is also a lack of entrepreneurial culture and limited access to financing options.

Figure 4-13 Aerial Photograph View of Heidelberg Technology Park.

Source: http://www.technologiepark-heidelberg.de

Heidelberg Technology Park's lack of industry sector diversification is another factor hindering its success, which characterizes it negatively as a specialized niche concentration of technological resources in a core region.

In conclusion Heidelberg Technology Park is a somewhat successful park because of its mass of intellectual capital. However, it is much less successful than Adlershof Technology Park because it has such a niche focus, limited finance options, and a high dependence on university research commercialization that all serves to bottleneck attracting new sector companies.

4.5.2.3 Key Success Factors for the German Case Study Parks

Based on the secondary literature review relative to the Adlershof and Heidelberg Technology Parks, and the set of factors in the GLOINTECH model the key success factors appear to be:

- Factor Conditions -> Availability & Quality of Labor -> Availability of Skilled Labor. [7, 8]
- Firm Strategy and Rivalry -> Existence of Industry Leading Firms -> Proximity to Leading Research Institutions. [7,9]
- Public Policy
  - Commercial, Monetary Policies, and Tax Incentives -> Direct Subsidies, Tax Incentives for R&D, and Tax Incentives for Capital Investment, particularly for small companies by the local government. [9, 11]
  - Positive Investment & Industrial Regime -> Favorable R&D Policy and Government Policies to Provide Incentives for R&D and Foreign/Domestic Investment. [9,10]
  - Supporting Economic Incentives -> Fiscal, Trade, Investment, R&D and Innovation Incentives. [9, 11]
- Business & Political Climate
  - Business Climate and Culture -> Climate of Business Innovation and Encouragement of Private Enterprise and Entrepreneurship [9, 11, 12]
- Innovation and Entrepreneurship
  - Existence of Entrepreneurial Base and Talent [9 13, 14]
  - Commercialization of Ideas -> Existence of Incubators [9, 13, 14, 15]

4.5.3 Asia and Oceana: Technology Park Overview

Figure below provides a map and the locations of the technology parks studied by GLOBUSTRAT in Asia and Oceania. The discussion that follows highlights the main features and best practices that were revealed by the detailed examination of these parks. Figure 4-14 below provides a map and the locations of the technology parks in the Asia and Oceana regions that were studied by the GLOBUSTRAT team. The discussion that follows highlights the main features and best practices that were revealed by the detailed examination of these parks and discussion with park management in some cases.

Figure 4-14 Technology Parks Studied in Asia and Oceana.

The major features and best practices that emerged from this study of technology parks can be summarized in the following brief points:

- Most research, science and technology parks are built either as part of Government initiative or privately owned.
- Contributions to science and technology park success:

  - Abundance of specialized / quality labor at competitive price.
  - Highly mobile work force.
  - Government Initiative & Support
- Success factors of select parks (i.e. Hitec City-India, Hsinchu-Taiwan, Zhongguancun-China):
  - Large pool of technical talent
  - Strong local and international demand
  - Access to top educational facilities and research institutions
  - Large network of suppliers
  - Access to venture capital
  - Favorable and open business climate
  - Incentives given by Government in early stages.
  - Support & infrastructure provided by Government (MCS, STPI, etc..)
- Collaboration between Universities or Businesses is very minimal and primarily driven by the cost factor and closeness to the developing market.
- Supporting institutions and ancillary services necessary for tech park success.
- Anchor effect plays a major role in the success of the park.
- Parks focus on few selected areas (Software, Manufacturing etc..)

(Information Technology Parks of the Asia Pacific, Lessons for the Regional Digital Divide. Meheroo Jussawalla and Richard D Taylor).

The main points of our case study of two parks are summarized below:

4.5.3.2 Case Study 1: Hsinchu Technology Park, Taiwan

Taiwan's industrial policy is characterized by intense government involvement. The government has frequently played a direct activist role reflected in "initiating" S & T development policies The NSC has effectively provided an institutional framework through which the country's technical talents and specialists are encouraged to devote themselves to technology upgrading and R &D. One of the most acclaimed decisions of the NSC has been its launching of the Hsinchu Science Based Park (HSIP).

During the past twenty years Hsinchu Science based Industrial Park has played a prominent role in reshaping Taiwan's industrial base and contributing to its economic development. Hsinchu Science-based Industrial Park was established in 1980 by the government of Taiwan to ignite an economic development engine in the island country. Over the past 20 years, the government's investment in this park has been only US$783 million. As of the end of 2000, there were 34 high tech companies crowded onto the Hsinchu Park's 605 hectares with annual sales of US$29.8 billion (which accounts for 4.5 percent of Taiwan's GNP). Since then sale has grown to US$32.5 billion, close to 400 companies employing more than 112,000 people, 97 listed companies.

The main industries park focus on is Telecom, Optotronics, Precision machinery, Biotech of Taiwan Industries.

In close proximity to the HSIP are major academic and research institutes including two national universities (National Tsing-Hua University and National Chiao –Tung University), and an advanced national R & D unit (Industrial Technology Research Institute). In addition, the National Science Council has established a number of national laboratories within the park. These academic and research institutes have been a significant source of technological development and human resources for the HSIP.

4.5.3.3 Case Study 2: Multimedia Super Corridor, Malaysia

Conceptualized in 1996, the MSC has since grown into a thriving dynamic ICT hub, hosting more than 900 multinationals, foreign-owned and home-grown Malaysian companies focused on multimedia and communications products, solutions, services and; research and development. The MSC Cybercity and Cybercentre follow the concept of industry clustering by locating similar technology companies within the same geographical areas.

The Malaysia government has established the Multimedia Development Corporation as the agency responsible for overseeing the implementation of the MSC. The MDC markets the MSC globally and works to provide clients with the information and assistance they need to maximize their participation and benefit from the MSC.

Several Venture Capital firms operate in the MSC (Led by the Malaysian Governments Malaysia Venture Capital Management Bhd.) which recently received $26 USD to invest in open source development. 18 other VC firms are listed as operating in the MSC.

A cornerstone of the MSC incentive is the 10 Bill of Rights: which ensure that companies will receive the promised benefits: The bill includes some of the following features:

- Provide a world-class infrastructure
- Unrestricted employment of both local and foreign born knowledge workers
- Ensure freedom of ownership
- Free movement of capital
- Competitive financial incentives including: 100 percent tax exemption for up to 10 years or an investment tax allowance for up to 5 years.
- Regional leader in IP
- No internet censorship
- Multimedia Development Corporation as the "one-stop" agency for facilitating firm support.

Even though the park has lot of positive factors, some of the significant negative factors include too much of government involvement, smaller labor pool & local market and to an extent the Asian financial crisis.

4.6 Summary

In this chapter, we presented an overview of the technology park industry worldwide. We first presented the nomenclature of technology conurbations in order to define and place technology parks in their proper context and in order to frame our discussion of such conurbations in what followed. We then presented a brief history of the development and growth of the global technology park industry. This was followed by an overview of the principal features and best practices of technology parks world wide organized in terms of the factors identified in the GLOINTECH model developed for and used in this study.

A brief overview of the features and best practices of technology parks in each major region of the world was then presented. Snapshot case studies of one successful park and one unsuccessful park in each region were also presented. The chapter also contains detailed profiles of over 30 major technology parks

Included in Appendix 2, is a comprehensive list of technology park development officials, local technology park authorities, and technology park experts worldwide.

The next chapter details the features and best practices of the financing of technology parks worldwide.

4.7 Sources - Chapter 4

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Chapter

5

5.0 Financing of Technology Parks

Worldwide Practices in the Financing of Technology Parks and Tenant Firms in Technology Parks.

5.1 Introduction

One of the major objectives of the project was to identify the key sources of financing of technology parks and firms within technology parks as well as understand the key success factors for the financing of technology parks. This chapter provides detailed information of the first part of this objective by detailing the sources of finance and the various methods of financing firms within technology parks. Chapter 7 identifies the key success factors in financing technology parks after the key success factors underlying the success of technology parks as a whole are presented in Chapter 6.

The objectives of this chapter are two-fold. First, we examine the major sources of technology park financing and detail the best practices of such financing from the rather sparse secondary literature on the subject. Next, we detail the sources of firm financing in technology parks and examine worldwide practices in venture capital financing and its variants, traditional bank financing, government financing, equity financing and IPOs, 3F (Family, Friends and Fools) financing, angel financing and other types of capital financing including R&D financing. It is clear that without substantial amounts of capital funding, technology parks would definitely not succeed.[1]

5.1.1 Financing of the Initial Investment for the Park

To successfully develop a technology park, the location of the site is very important. It needs to have the appropriate infrastructure to support growth. The provision of reliable infrastructure (e.g. utilities, emergency response) increases the attraction to research and technology organization, which leads to the likelihood of occupancy.[2] Initial management expenses include start up costs relating the feasibility studies, market research, physical planning, promotion and administration. Park authority needs to work closely with the government to facilitate the development of this. The role of government in the development of a tech park could play a major direct role, where the state may provide concessional land, financial incentives, and negotiate to bring in some anchor tenants with lucrative incentives. The government could also assume a more laissez-faire role, providing mainly the normal infrastructure under commercial term.1

5.1.2 Financing for Continuing Operations

A technology park represents a major investment which spans over decades from inception to maturity. Adequate financial resources are required to provide satisfactory services to tenants. Rental income, in the early phase, may not be sufficient to meet the need. Continuous inflow of capital helps to maintain the proper operations of the park.

5.1.3 Financing for Tenant Companies

In order to sustain the growth of a high technology park, the financial health of the firms in the park is paramount. The accessibility of capital funding determines the survival of a firm. Traditional debt financing would not be enough because of the unique investment requirements. The sources of the funding to finance these capital-intensive industries include

- 3F funding (friends, family, and fools)
- Angel Funding
- Venture Capital
- Banking Financing
- Government Funding
- International Source of Finance

At different stages of the company, the funding would come from different sources. In what follows, the details of how a technology park is financed, and how the firms in a technology park is financed are discussed.

5.2 Park Financing

The costs and methods of developing and financing technology parks vary from country to country. Nevertheless, the creation of a successful technology park by any standard is a costly endeavor. The costs of development are usually much greater once buildings are considered as part of the development. Although capital for infrastructure and property is the most visible component, there are other important cost factors to consider, for example, the management and operation of the technology park. These management functions involve:

- Securing resources for the development of the technology park
- Promoting the technology park and identifying and securing the tenant companies
- Providing the all important links between tenant companies and universities, research and development facilities and industrial enterprises
- Assisting young and start-up high technology companies with business plans and problems as they arise
- Management of the land and buildings on the estate
- Operating and providing services in the estate
- Planning the estate and its strategy and making investment decisions

There are usually four types of technology parks in the world, namely:

1. Public or not-for-profit technology parks
2. Private technology parks
3. Academic-related technology parks
4. Hybrid technology parks

Public or not-for-profit technology parks and incubators are usually sponsored by governments and not-for-profit organizations and serve primarily the purpose of local economic development such as job creation, economic diversification and/or expansion of the tax base.[3]Private technology parks are initiated and developed by private investor groups, real estate development companies and large private companies for profit and are run with the objective of generating market returns to their shareholders or owners.

The major sources for funding of technology parks are the following:

- Grants and gifts
- Sponsorship
- In-kind support
- Soft loans
- Commercial loans
- Commercial leases
- Income for services provided
- Rental Income
- Revenue sharing with partners
- Shareholder funds
- Equity participation with client companies
- Royalty agreements

5.3 Financing of Firms in Parks

5.3.1 Types of Firm Financing

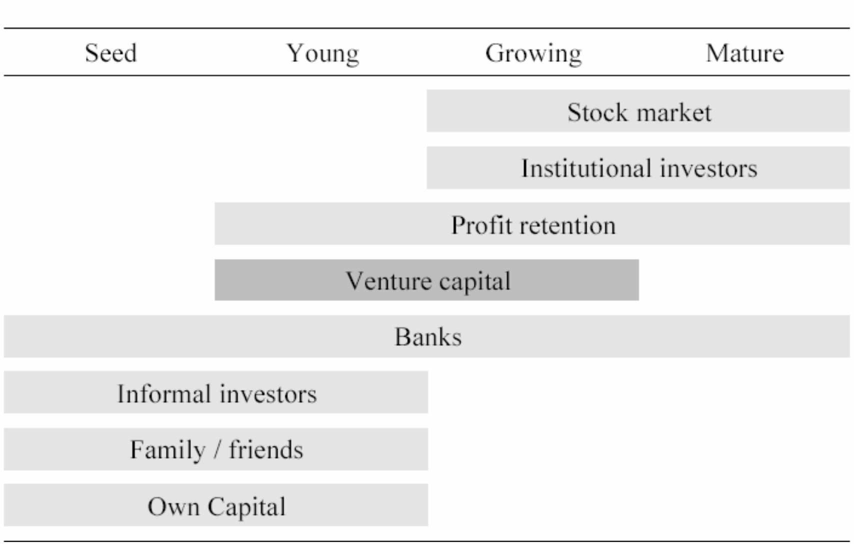
There are a number of sources of financing available for firms that are located in technology parks. It must be noted that these sources do not differ from those that are available outside technology parks in the general market environment. The major sources of financing are:

- Angel Financing
- Private Venture Capital Financing
- Private Equity Financing
- Corporate Venture Capital Financing
- Venture Leasing
- Commercial Bank Loan
- Traditional Equity Finance/IPOs
- Other Commercial Loans (e.g. corporate bonds)
- Government-Backed/Subsidized Private Loans
- Direct Government Loans
- Government R&D Grants and Loans
- Self-Funding (Family, Friends and Fools – 3Fs)

While each one of these sources can be discussed at great length, we will focus on high technology finance sources beyond the normal pale of traditional bank financing because of the subject of this study being technology parks. This does not mean that the other sources of finance such as traditional bank finance are not important. In fact, as will be shown in the next section on technology park and firm financing in the different regions of the world, it will be seen that traditional sources of finance are very important for technology firm financing in many regions of the world.

Figure 5-1 below shows the various types of financing available at different stages of growth of the business firm (not just high technology firms which also follow the same pattern). At the seed stage, the primary sources of finance are the 3Fs, the entrepreneur's own capital and informal investors. These informal investors are usually angels who are on the look out for "home run" investments in industry and service sectors that are familiar with. Banks may also be sources of finance at this early stage. Venture capital becomes interested only when the firm has reached the young (early) stage but not as interested as it becomes at later (growth) stages. Profit retention for those firms that have exceeded break even also becomes a source of funds at this stage. At the growing (later stages), these two sources are joined by institutional investors and the stock market. VCs, in particular look for their exit by IPOs and buyout from these two categories of sources of funds.

Figure 5-1 Sources of Firm Financing at Various Developmental Stages



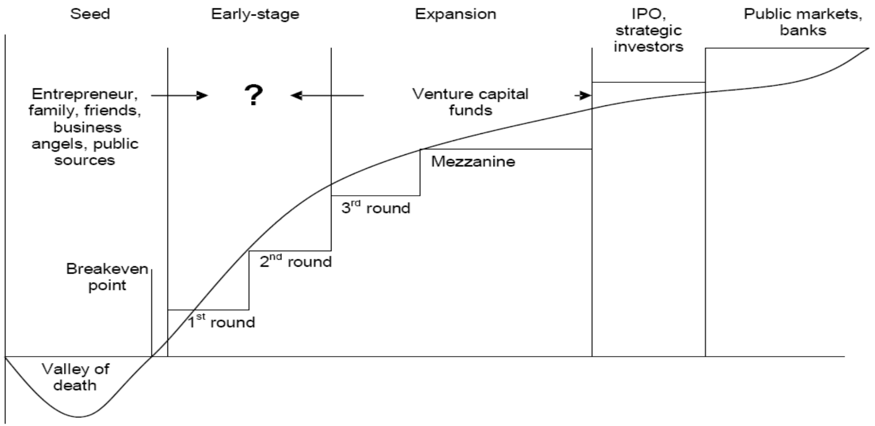
Source: Adapted from Netherlands, Ministry of Economic Affairs, 1999 OECD-The Internationalization of Venture Capital Activity in OECD Countries: Implications for Measurement and Policy By Günseli Baygan and Michael Freudenberg

Figure 5-2 shows the equity financing cycle to depict the same process in a different manner and is largely self-explanatory.

Figure 5-2 The Equity Financing Cycle

2.2 Equity financing lifecycle

Figure 1. Stages of equity financing

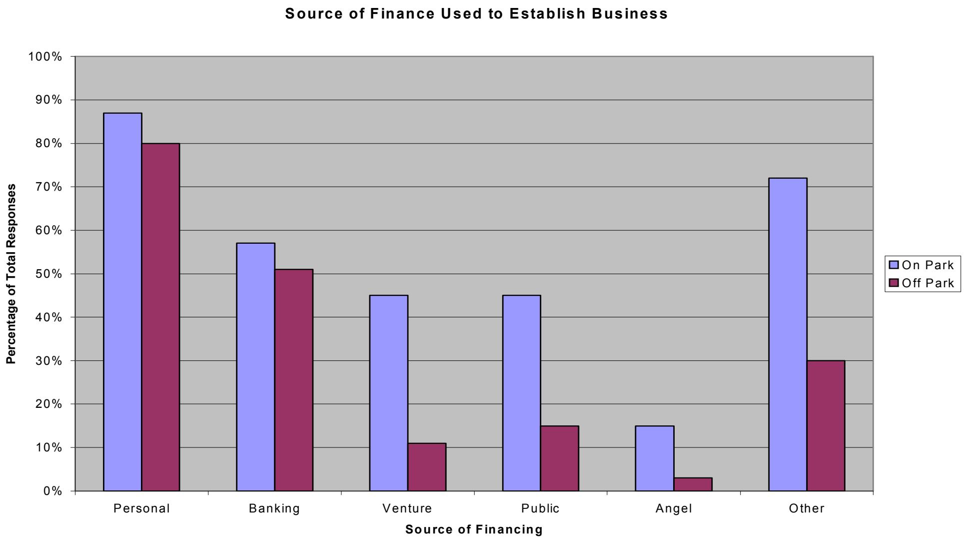


Graph adapted from Cardullo: Technological entrepreneurism.
Note that definitions for most of the concepts used in SME finance are not universal.

Not much information is available regarding the sources of financing of firms in business parks due to the nature of most financing being reported by type of sector or type of firm rather than by geographical location. Technology parks typically do not publish data about firm financing in their park. In addition to the survey conducted by our GLOBUSTRAT team whose results are presented in Chapter 7, the United Kingdom Science Parks Association (UKSPA) has published data on a survey conducted in 2003 of 617 companies which were then compared to survey of 259 off-park companies.

Figure 5-3 shows the sources of finance used by the on-park sample and the off-park sample to establish their business. It can be seen that while both on-park and off-park firms used their own personal sources and bank sources for establishing their business as the primary sources, on-park firms tended to use "Other" sources of finance as a primary source ("other" was not defined). Venture capital and public sources were also used more by on-park firms than off-park firms.

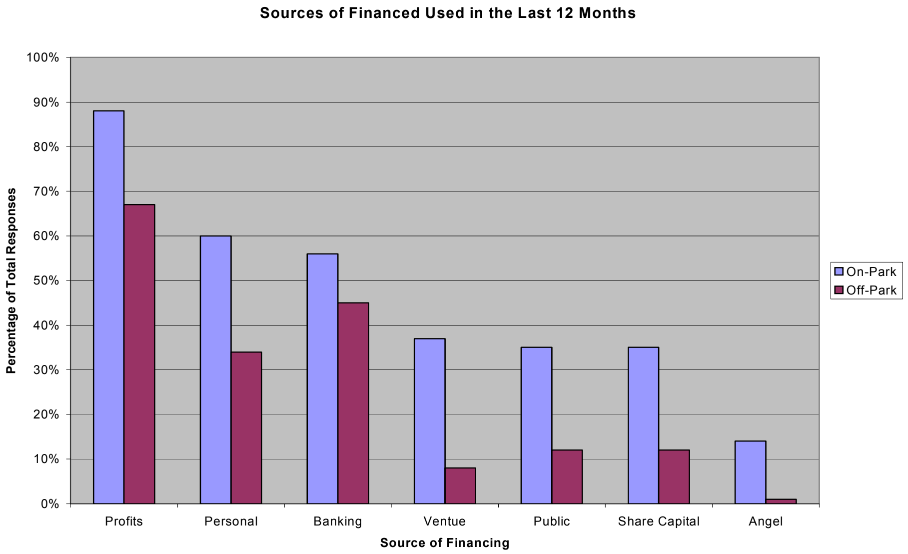
Figure 5-3 Sources of Finance by UK Firms to Establish Business



Source: UKSPA UK Science Park Movement Survey, 2003

The UKSPA Survey also looked at recent sources of finances used by the on-park and off-park firms in the last 12 months before the survey was administered. The results are shown in Figure 5-4. Profits and share capital were added as sources of finance since the firms had matured beyond the start up stage. It can be seen that profits were the primary source of finance at this stage followed by personal and bank sources of finance.

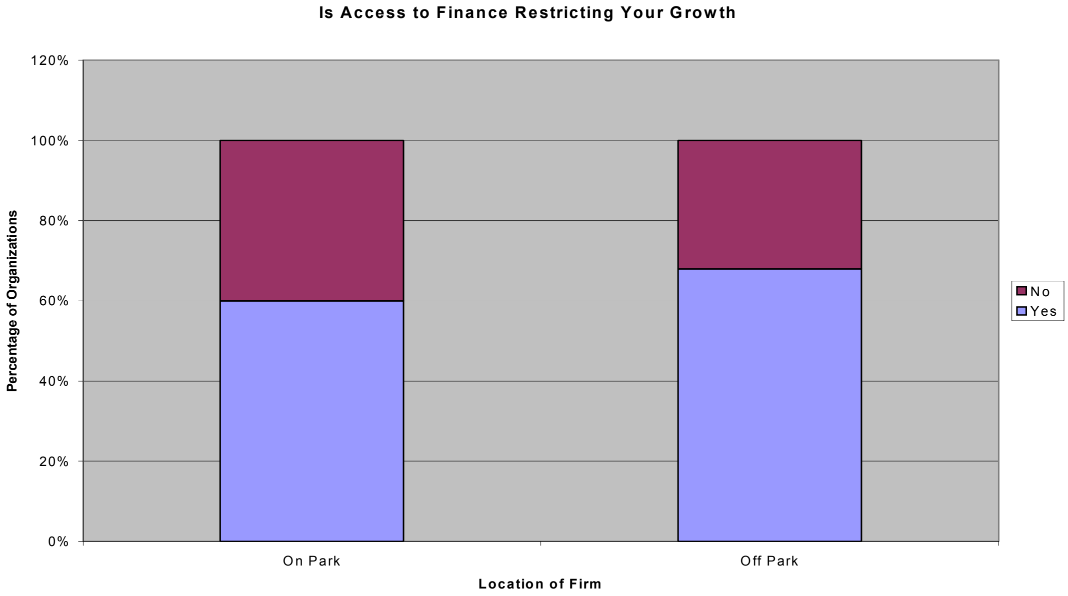
Figure 5-4 Recent Sources of UK On-Park and Off-Park Firm Finance



Source: UKSPA UK Science Park Movement Survey, 2003

The UKSPA survey also asked respondents their view of whether finance (or rather the lack of it) had acted as a restrictor of growth. This data is summarized in Figure 5-5 below. It can be seen that fully 60% of the on-park companies and 68% of the off-park companies felt that access to finance was a factor contributing to limiting their growth.

Figure 5-5 Finance as a restrictor of growth



Source: UKSPA UK Science Park Movement Survey, 2003

Next, we look at the drivers that drive investment in firms in technology parks, focusing on venture capital financing but also mentioning the other sources.

5.3.2 Drivers for Investing in Firms in Technology Parks

This section will discuss the forces that encourage financial entities (in particular venture capital institutions) to invest in firms in technology parks. While venture capital financing is the primary focus, it is also recognized that venture capital financing is not appropriate for most small and medium enterprises (SME). However, the nature of technology firms is such that it "is a type of capital that is particularly suitable to the financing of innovation – the financing of enterprises that are attempting to so something new and untested."[4]

In a recent Association of University Research Parks (AURP) survey, 50% of the parks surveyed cited that lack of venture capital was a significant barrier to research park growth.[5] In separate International Association of Science Parks (IASP) associated study found that 71.2% of parks acted as a conduit for venture capital financing and 17% owned venture capital or seed funds. [6]

Venture capital is defined as equity financing, over US$500,000 that is provided by institutional investors targeting start-up and early stage companies. Two related financing forms are angel investing and private equity. Angel investing, which also target start-up and early stage companies, is provided by individual and group investors who are not classified as institutional and typically invest less than US$500,000. Private equity is provided by a group of institutional investors who typically provide financing to later stage firms for acquisition and buy-out in excess of US$500,000.[7] This section will focus on venture capital as the most important source of technology-company financing and briefly discuss angel investing.

Clearly, venture capital is the most appropriate form of financing for the target tenant firms of a technology park. To attract or link venture capital financing to park tenants, it is important for park managers to understand why venture capitalists will invest in these target firms and determine what policies and actions can be implemented by the Sapiens Parque authority to facilitate a strong flow of venture funding to park tenants.

Investors in venture capital funds are looking for substantial returns. In the United States, they expect a return of 20-25% or greater.[8] To be able to obtain these high returns for their investors, venture capitalist must have a strategy that allows them to find companies that can produce high returns within acceptable risks. While it is often believed that venture capitalists invest in good people or ideas, "the reality is that they invest in good industries."[8]

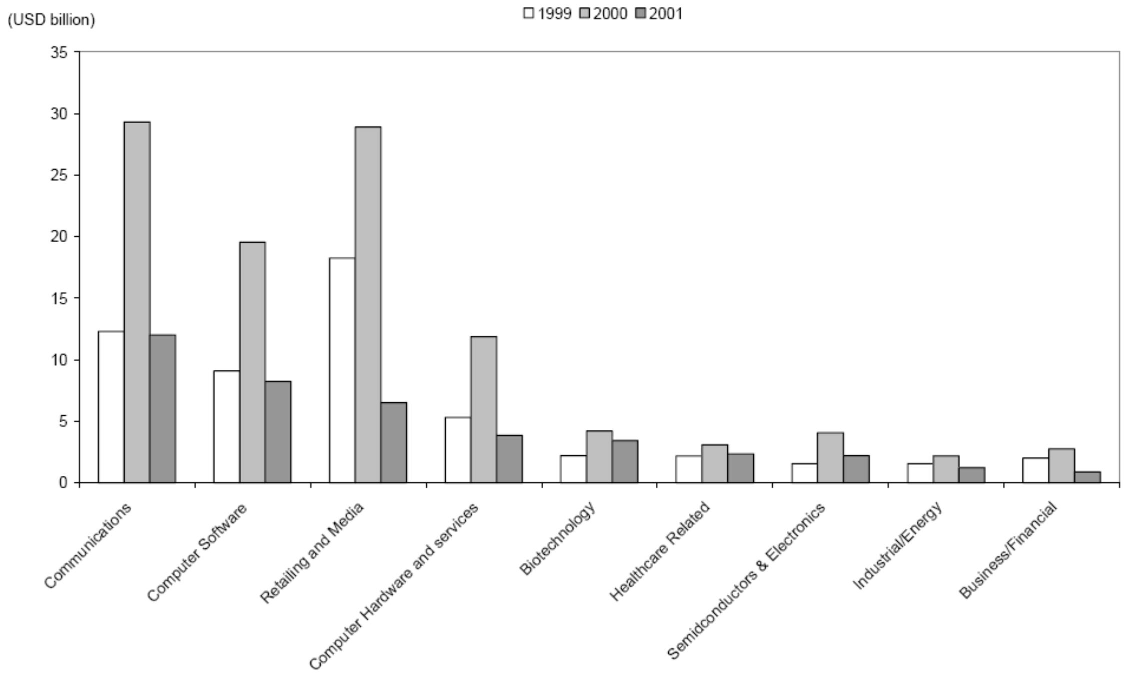
Venture capitalists also look for business models that contain defensible and lasting competitive advantage (e.g. Intellectual property). "Technology really defines the potential barriers to entry. Have you filed any patents? How many man-years might it take for others to replicate what you have done?" [9]

In the United States, venture capitalists tend to focus on key growth industries. The majority of investments went to computers, communications, health care and biotechnology during the period of 1999-2001. This industry concentration was also seen in Canada, Europe, and Asia. The reason for industry concentration is that it is easier for companies to grow in high-growth segments than to grow in low growth or no growth segments.[9] These high growth segments will provide the returns that venture capitalist seek. Venture capitalists are able to limit their risks to "the ability of the company's management to execute."[9]

Another interpretation of the industry selection is that venture capitalists herd, "Venture capitalists often look around at other investors to determine what is "hot". Venture capitalist will chase after promising industries and that seem to offer the high growth opportunities they are seeking. However this behavior can lead to a boom and bust problem and too much focus on one industry at the expense of an equally deserving industry that is ignored because it is not hot.[10]

Figure 5-6 shows U.S. venture capital investment by sector during the 1999-2001 period. It can be seen that the telecommunications, computer software and hardware and retailing and media sectors got the bulk of venture capital funds during 1999-2001 reflecting the sector focus of such funds. It also shows that the amounts fluctuated substantially for these sectors, rising by more than two and a half times during the 2000 year when the dotcom boom had already passed its peak (the dotcom bust started in March 2000) only to collapse in 2001 following the bust.

Figure 5-6 US Venture Capital Investment by Sector 1999-2001

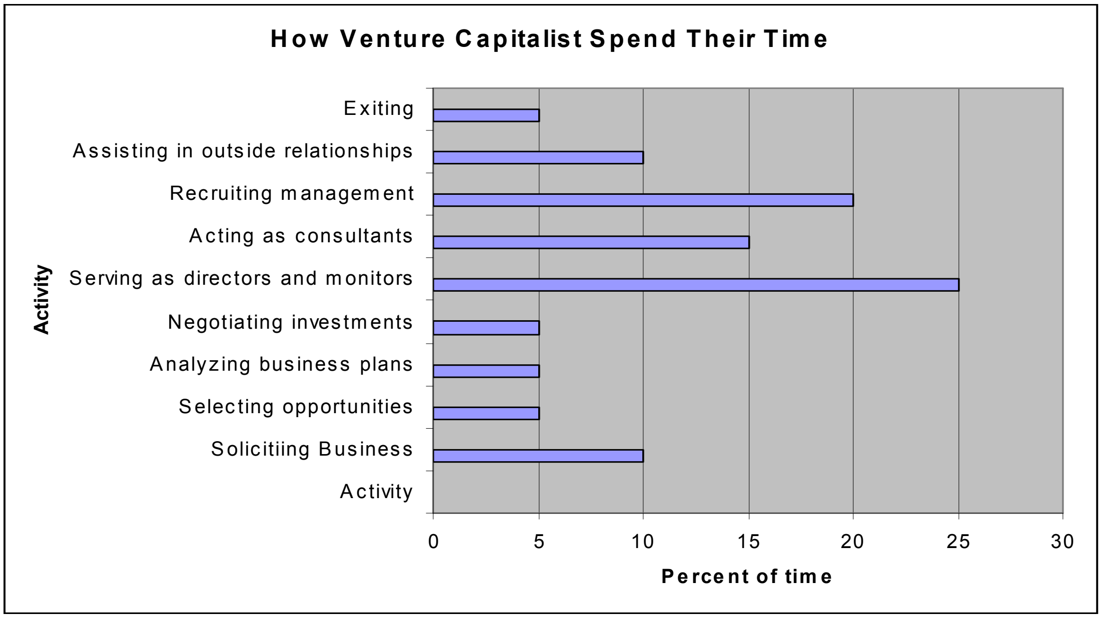


Source: OECD Venture Capital Policy Review-United

Ultimately, private financial institutions are profit seeking organizations that are on the hunt for profitable investment opportunities. No matter how beautiful and sophisticated a tech parks is, if the tenants do not present attractive investment opportunities to the private financial institution, they will not participate. It is important for technology park managers to attract industries that have the potential to match well to venture capitalist investment criteria. If there are too many companies that don't match up, venture capitalists will look elsewhere.

Technology parks have the opportunity to provide a concentration of investment opportunities. Working toward the technology park's advantage is the fact that venture capital is primarily a local phenomenon. Venture capitalists typically want to be close to their investments due to the nature of the industry. They will participate on boards, serve as directors, recruit management and be engaged with the company.

Figure 5-7 How Venture Capitalist Spend Their Time

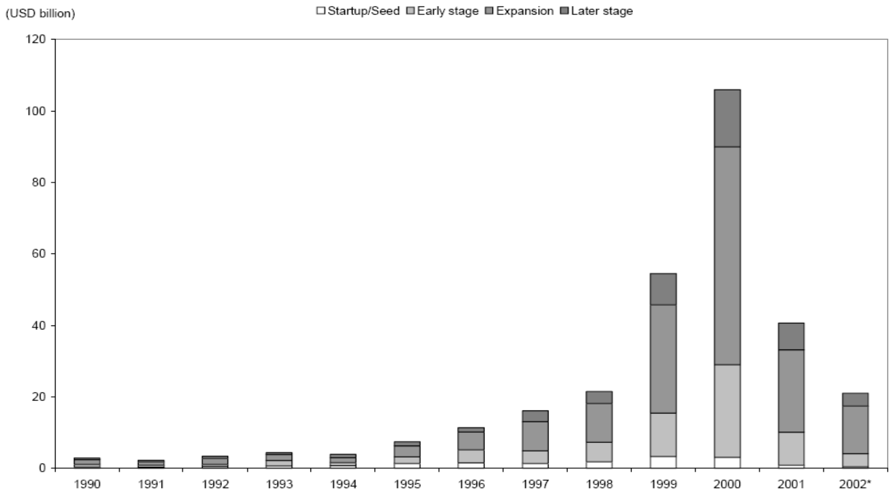


Source: Zider, Bob, "How Venture Capital Works", Harvard Business Review – 98611, November – December 1998, pp. 137

Venture capitalists are constantly looking for mechanism to efficiently link investors to deals. "VCs are attracted to university incubators for a number of reasons, including lower burn rates and less risk due to investment and vetting by groups familiar with technology."[11] It is important for an incubator or technology park to develop a sound network of venture capital institutions to match with their park tenants. "Purdue's incubator has a good reputation among venture capital firms and wants to attract VCs that get involved early."[11] Also noted is that venture capitalist look to universities for their ability to help firms gain access to research grants and other sources. "Opening the doors to that capital will create a portfolio of stronger companies…"[11]

Venture capitalists tend to invest older and larger firms. In most cases, very little venture capital money goes to the start-up and seed stage companies. This can create a financing gap for the firm which can make it difficult for new companies in technology parks to gain financing. In the United States, start-up and seed financing represents very little of the overall venture capital activity. This is also true in Europe and Asia except in a few select countries like Korea and Israel.

Figure 5-8 US Venture Capital Investment by Financing Stage, 1990-2002



Source: OECD Venture Capital Policy Review- United States

Angel investors play an important role in financing firms at very early stages when they may not be ready for institutional venture capital investment. Angel investors organize into business angel networks to provide small capital (the average angel investment is (US$ 50,000 to 100,000) to companies before VCs participate. Angels tend to be local and informal investors who are often retired executives that invest in industries they have knowledge or experience in.[12]

"The ideal structure of angel funding would be in the form of a "bridge: to the next round-called bridge financing…"[13] Venture capitalist tend to look to companies that need more money or are further along in the development stage. Technology park managers should also ensure that they develop networks with angel investors for companies that are not ready for the institutional investor.

Corporations also play an important role in venture capital. Technology companies like Oracle and Intel form their own VC arms. These companies invest in promising technologies in hope of gaining access to new innovations. [14] Corporate venture capitalists are motivated to gain access to intellectual property and key research and development. Companies like Cisco Corporation, which have been able to achieve fast results from acquisitions rather than internal research and development have created strong interest in corporate venturing[15] Recently, an article appeared in Business Week describing how Google, with massive market capitalization, has become a competitor with the traditional Silicon Valley venture capitalists bidding up the price of deals.[16]

However, corporate venture capital can also cause problems for the corporations. The sector has fluctuated even more than the traditional venture capital sector, perhaps due to the risks involved:

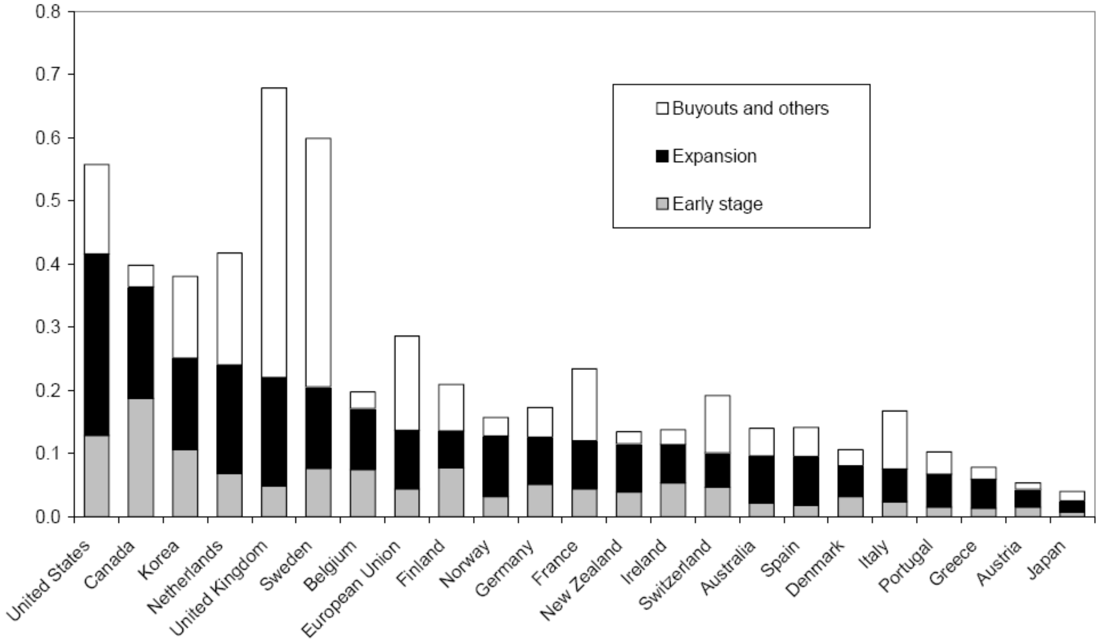
- Disappointing returns for the corporate investors,
- Highly variable returns on investments,
- Difficulty in gaining access to the best deals,
- Distraction of corporate management from core business,
- Embarrassing publicity from poor investments,
- And, start-ups that end up cannibalizing the core business.[17]

Additionally, corporate venture capital only makes up a very small share of the overall venture capital industry. In Europe, corporate venture capital represents a small percentage of overall venture capital activity. However, corporate venture capital dollars are much more targeted toward start-up stage companies.[18]

Technology park managers may want to consider recruiting corporate anchor tenants that have active corporate venture capital programs. These programs can play a role in helping to provide venture capital funds to SME park tenants either independent of the park, or in cooperation with park management in the form of a joint corporate and park venture capital fund.

The external environment in a particular region can greatly impact the level of venture capital activity. Venture capital requires circumstances that are conducive to investment activity. If these circumstances are not available, venture capital will not thrive. Technology park managers need to carefully asses if the circumstances exist in their location for a viable venture capital industry. In many regions of the world, where favorable conditions do not exist, venture capital activity is limited or non-existent.

Figure 5-9 OECD Venture Capital Investment by Stages as Percentage of GDP, 1998-2001



Source: OECD Venture Capital Policy Review- United States

Venture Capital requires specific skill sets that are not always present in conventional financial industries. Successful venture capitalist must be knowledgeable about the technologies dominant in targeted industries. They must be able to evaluate companies at very early stages of development, often before the company is generating meaningful revenue. Venture capitalists also provide a wide array of activities which requires a diverse set of skills (See Figure 5-7). Venture capital companies will have difficulty becoming established in a particular region if they cannot gain access to a people who have the skills required to successfully operate in the industry. The talents and skills needed to be successful in venture capital have taken many years to develop in the United States.[19]

In some countries, most notably Europe and Japan, banks actively participate in the venture capital industry. In Europe, banks are among the largest investors to venture capital funds and provide a significant amount of the funds available in the industry. In Japan, banks can actually play roles similar to that of venture capitalists, taking equity positions in companies and having influence on the company management. In the United States, laws do not allow banks to participate so actively in the venture capital industry.

Government policy is an important drive for creating an active and sustainable venture capital industry in a particular region. It can be used to encourage favorable investment environment by creating stable macro-economic conditions and taking specific actions to spur venture investment. Specific government policy has major impact on venture capital activity. Government can provide catalyst for an improved venture capital environment by:

- **Developing a legal framework and regulations that promotes venture capital**

  In the United States, changes in the laws called Employee Retirement Income Security Act (ERISA) allowed pension funds to invest more money in venture capital greatly increasing the supply of funds for venture capital.[20]

- **Prime pump with specific government backed programs**

  In the United States, the Small Business and Investment Company program was used to boost the domestic venture capital program. More recently, Israel and Korea and also used government programs to spur venture capital development.

- **Exit opportunities via second-tier markets for IPO**

  Almost all countries that have successful venture capital industries have secondary stock markets that ease the process of new companies making initial public offerings. This is important because it creates a vehicle for venture capitalists to realize liquidity from their investment. If venture capitalists cannot see an exit from a deal within a reasonable time-frame, the will be less likely to participate.

- **Tax policies to encourage investors**

  Specifically, decreases in the capital gains tax, to attract more investment in venture capital funds. In the United States, both low capital gains and targeted tax incentives have had significant positive influences on the venture capital industry.

Establishment of Government based local and regional venture capital funds to help direct venture capital to new areas. In the United States, as well as Europe and Asia, local and state governments have established programs to encourage venture capital. Many of these programs are designed to encourage new venture capital where it does not exist.

Government intervention in the financial markets can go too far and crowd out private investment. If government creates a very effective public venture capital program, it may compete with and ultimately put out of business any private industry effort. It is better for the government to try to develop programs that act as catalyst to the private sector and avoid competition.

5.3.3 Summary on Financing Drivers

A continuum of capital from angel to venture capital to exit must exist to have a truly viable private venture capital industry. Where gaps exist in this continuum, firms will have difficulty obtaining financing. Without angels to invest in seed and very early stage firms, fewer companies will be started and there will be fewer investment opportunities for institutional venture capitalists. In the same way, if a viable exit strategy does not exist, venture capitalists will balk at participating in deals. There must be a market for initial public offerings or merger and acquisition (preferably both) for them to be a viable venture capital environment.

VC industry needs highly skilled people who can find, evaluate, fund, support and monitor investment opportunities. The lack of people who have the skills to participate in venture capital may be the most important barrier to a viable and growing venture capital industry. Most venture capitalists learn their skills on the job and it can take several years to train enough people for a sustainable industry.

Government policy can be used to stimulate VC by supporting various elements of the continuum; even at a very local level. Intervention should be focused on creating a catalyst for a private venture capital industry with every expectation that government support will cease once the private venture capital industry is sustainable.

5.4 Financing in Major World Regions

We review the financing types and sources used in different parts of the world in this section. This has been done to understand the principal financing sources and the best practices in financing in these regions of the world in order to provide Sapiens Parque management with the best up-to-date information on the financing of technology parks. We particularly provide information on the Asian region which may have great relevance for Brazil being at similar levels of development.

5.4.1 Financing in North America

5.4.1.1 Overview of Venture Capital's Business Cycle

Venture capital is a cyclical business, subject not only to internal dynamics, but to the influence of external economic sources and to fluctuations in financial markets. Indeed, the data show that ventured firms increased their size and share in the economy over the last three years, despite the dot-com bust and high-tech equipment sales downturn. Venture supported firms showed continued solid progress.

5.4.1.2 Venture Capital's Impact on the U.S. Economy

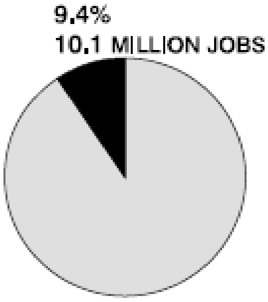
As per a study by Global Insight, Venture Impact 2004: Venture Capital Benefits of the U.S Economy, commissioned by the National Venture Capital Association (NVCA),

> "The venture capital contribution to U.S. jobs, economic growth, and technological progress has climbed steadily over the last three years. Venture capital continued to play a paramount role in nourishing the U.S. economy by bringing concepts and business models to life."

Venture Capital backed companies boost America's economic strength

The venture capital sector has grown to become a major force in the U.S. economy. Venture capital funded companies are an integral part of the American economy. The dollars and cents contribution of the venture capital industry goes well beyond the objective economic contribution. It continually reinforces America's entrepreneurial spirit. And in so doing, the venture capital industry becomes a catalyst for change. Venture capitalists, many of whom are successful former entrepreneurs themselves, shepherd new business men and women to reach their full potential. Figure 5-10 shows that fully 9.4% of the total workforce in the United States is employed at venture capital-backed companies

Figure 5-10 Employment at Venture Capital Backed Companies as % of Total Workforce 2003

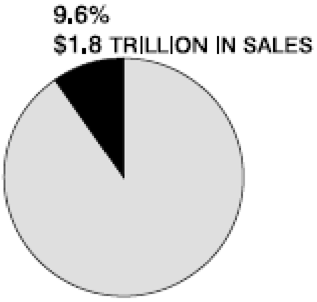


Source: Global Insight Study Venture Impact 2004

Venture Capital Backed Firms outperform other companies:

Venture capital funded companies were directly responsible for more than 10 million jobs and $1.8 trillion in sales in 2003. This corresponds to 9.4 percent of total U.S. private sector employment and 9.6 percent of company sales. This is impressive given that venture investment was less than two percent of total equity investment for most of the past 34 years. Sales performance is shown in Figure 5-11below.

Figure 5-11 Sales at Venture Capital Backed Companies as a Percent of All Sales 2003

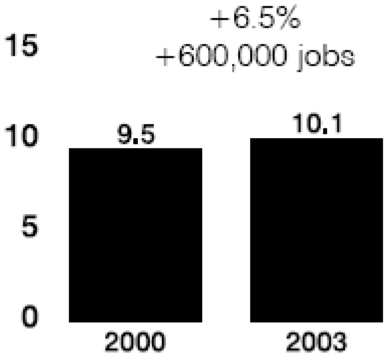


Source: Global Insight Study Venture Impact 2004

Venture Capital Backed Companies Create Jobs

Venture backed firms added some 600,000 net jobs to the U.S. economy between 2000 and 2003. Venture supported firms such as eBay, Google, and JetBlue are just three examples of the many successful ventured businesses that have hired hundreds of new employees over the last three years. This is shown in Figure 5-12below.

Figure 5-12 Employment by Venture Capital Backed Companies 2003 (in Millions)

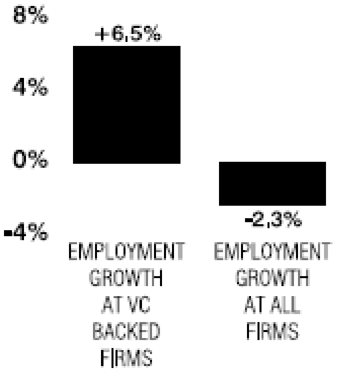


Source: Global Insight Study Venture Impact 2004

Venture capital backed firms create jobs at a significantly faster rate than their non-ventured counterparts. Venture backed firms increased their employment base by 6.5 percent between 2000 and 2003, while overall total private sector employment dropped by 2.3 percent during the same time period. The Global

Insight analysis shows that ventured firms were only mildly impacted by the recession. This is shown in Figure 5-13

Figure 5-13 Venture Capital Employment Growth vs. Total Employment Growth 2000 -2003

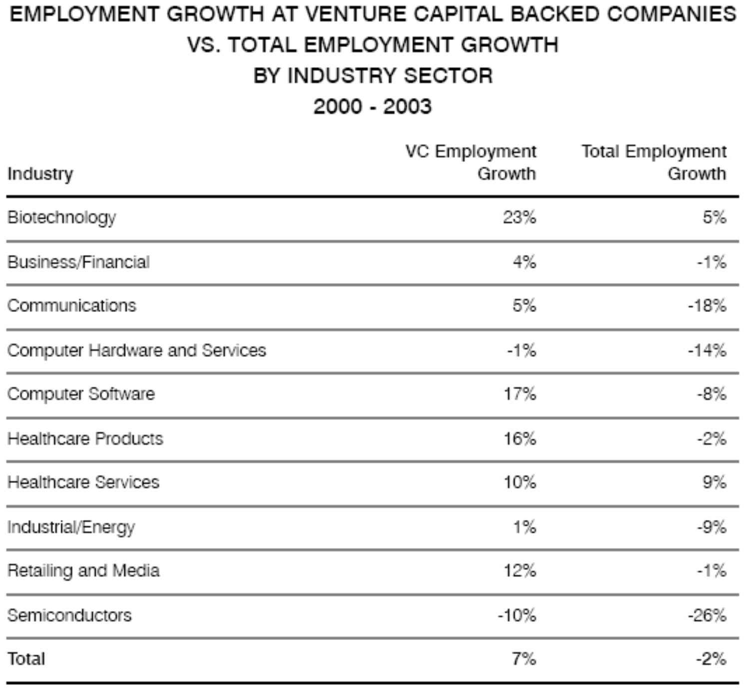


Source: Global Insight Study Venture Impact 2004

The venture capital job creating engine is not limited to one segment of the economy. It permeates the entire American economy. Global Insight examined 10 major industry sectors and found employment gains in all but two of these sectors for venture capital backed companies. Ventured companies in biotechnology posted an employment gain of 23 percent and healthcare products grew by 16 percent between 2000 and 2003. Only two industry sectors --- computer hardware and services and semiconductors --- experienced net job losses for venture backed firms between 2000 and 2003. Not only did ventured firms grow faster than their national industry counterparts, but sectors with a higher concentration of venture capital financing experienced higher employment growth differentials. This is shown in Table 5-1.

The best example is the computer software industry, where venture backed firms employ 88 percent of all computer software workers. Venture backed firms grew by 17 percent, while the industry as a whole declined by nearly 8 percent.

Table 5-1 Employment growth of Venture Capital backed companies.



EMPLOYMENT GROWTH AT VENTURE CAPITAL BACKED COMPANIES
VS. TOTAL EMPLOYMENT GROWTH
BY INDUSTRY SECTOR
2000 - 2003

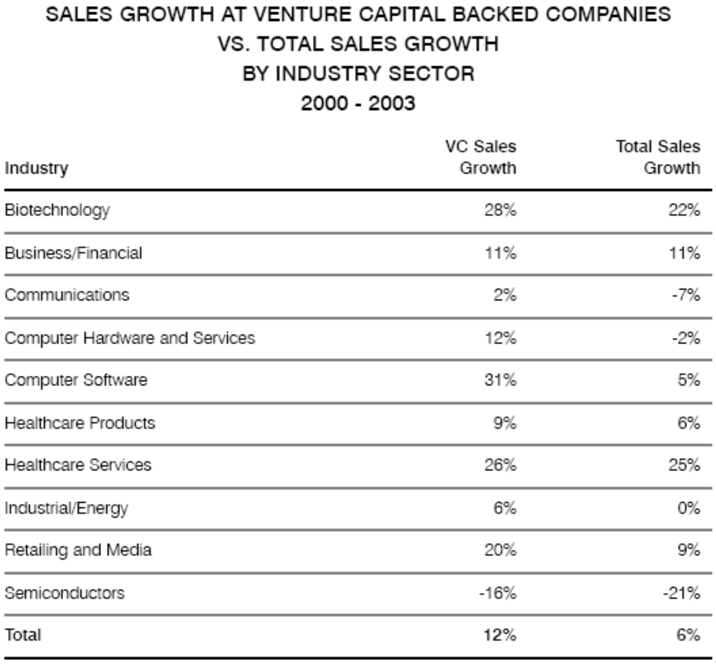
Industry	VC Employment Growth	Total Employment Growth
Biotechnology	23%	5%
Business/Financial	4%	-1%
Communications	5%	-18%
Computer Hardware and Services	-1%	-14%
Computer Software	17%	-8%
Healthcare Products	16%	-2%
Healthcare Services	10%	9%
Industrial/Energy	1%	-9%
Retailing and Media	12%	-1%
Semiconductors	-10%	-26%
Total	7%	-2%

Source: Global Insight Study Venture Impact 2004

Venture Capital Backed Companies drive sales:

Venture capital backed firms outperformed the national economy in overall sales growth. Sales at venture backed firms grew by 11.6 percent between 2000 and 2003, compared to an overall 6.5 percent growth nationally. Like employment, venture capital backed firms outperformed their national counterparts in every industry sector when measured by sales. Again, the computer software industry provides a strong example of the differential. Venture backed computer software companies witnessed sales growth of 31 percent, compared with an overall 5 percent growth rate for the industry sector as a whole. The results reflect strong growth prospects and high venture penetration in some of the most technologically advanced sectors, particularly medical, which grew rapidly during this period. This is shown in Table 5-2.

Table 5-2 Sales growth at venture capital backed companies



SALES GROWTH AT VENTURE CAPITAL BACKED COMPANIES
VS. TOTAL SALES GROWTH
BY INDUSTRY SECTOR
2000 - 2003

Industry	VC Sales Growth	Total Sales Growth
Biotechnology	28%	22%
Business/Financial	11%	11%
Communications	2%	-7%
Computer Hardware and Services	12%	-2%
Computer Software	31%	5%
Healthcare Products	9%	6%
Healthcare Services	26%	25%
Industrial/Energy	6%	0%
Retailing and Media	20%	9%
Semiconductors	-16%	-21%
Total	12%	6%

Source: Global Insight Study Venture Impact 2004

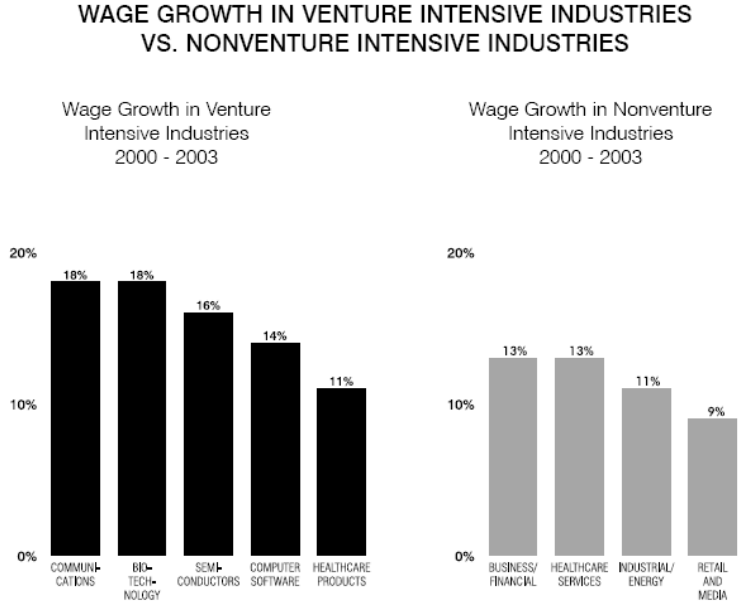
The data also reveal that venture capital financiers are efficient movers of capital. In fact, they often help in the creation of these fast growing industries. They are instrumental in bringing new ideas to the market.

Venture Capital Backed Company wages grow faster than national average

The Global Insight study shows that venture capital firms tend to cluster in fast growing and higher paying industries. The figures below show the wage growth for those industries that have a high intensity of venture capital investment and those industries with a low intensity of venture capital investment. Those firms with a higher intensity of venture capital tend to be firms that also have a higher wage growth.

Figure 5-14 shows that wages paid by venture capital backed firms grew by 12 percent between 2000 and 2003, compared to a national wage growth rate of 11 percent. As the graph below illustrates, the 5 venture-intensive industries with the most rapid wage gains are communications, biotechnology, semiconductors, computer software, and healthcare products.

Figure 5-14 Wage growth in venture intensive industries



Source: Global Insight Study Venture Impact 2004

Several venture capital intensive industries posted substantial wage increases in the last three years. Wages in biotechnology and communications each jumped by 18 percent between 2000 and 2003. Other fast growing industries measured by 2000 to 2003 wage growth rates were semiconductors, computer software, and healthcare.

Venture Capital Fuels the Birth of New Publicly Traded Companies

There are five stages in the investment financing of a firm: seed; start-up; early; expansion; and later. Most venture outlays focus on the seed, start-up, and expansion stages. A tiny fraction of venture capital money, about 2 percent, goes to the earliest stage of financing, called seed money, which constitutes funds for initial research to prove a concept. A significant portion of venture capital is invested to support product development and initial marketing, often referred to as start-up funds. Global Insight reports that seed and start-up activities constituted $21.4 billion out of the total $340 billion invested in all the business stages. This accounts for approximately 6.3 percent of all U.S. venture capital disbursements.

Venture capital backed merger and acquisition activity

Mergers and acquisitions (M&A) are an important liquidity strategy for venture capitalists and the start-up firms they fund. There has been a recent boom/bust in M&A activity. Total venture backed merger and acquisition activity with disclosed values dropped from a high of 202 in 2000 to 122 in 2003, plummeting from $68 billion to $8 billion. This is shown in Table 5-3

Table 5-3 Venture capital backed mergers and acquisitions

VENTURE CAPITAL BACKED
MERGERS AND ACQUISITIONS WITH
DISCLOSED VALUES
1997 - 2003

Year	Total Deals	Total Price (in billions)
1997	115	$7.4
1998	132	$9.1
1999	161	$37.5
2000	202	$68.4
2001	165	$17.7
2002	150	$7.8
2003	122	$7.7

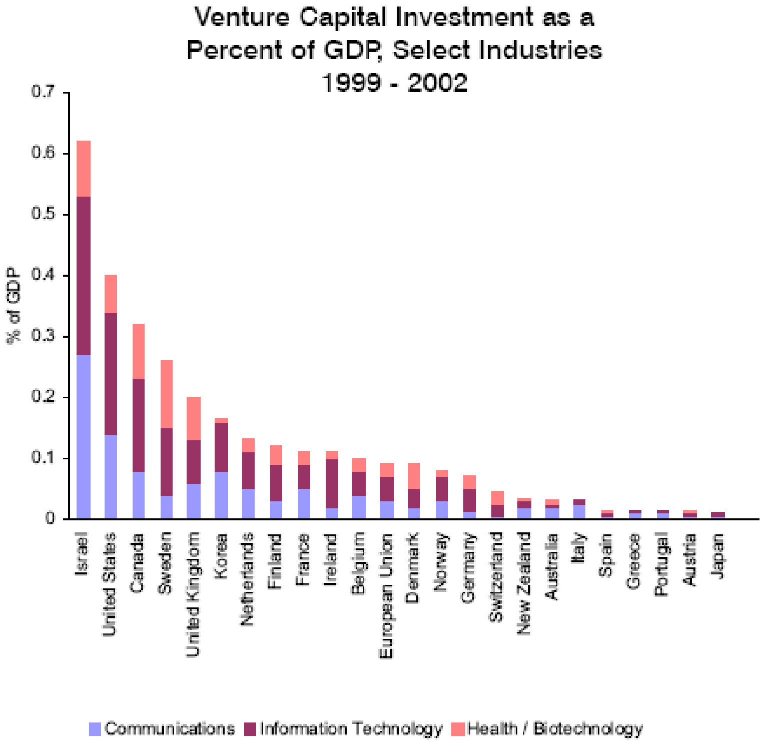
Source: PricewaterhouseCoopers/Venture Economics/National Venture Capital Association MoneyTree(tm) Survey

Venture Capital Supports U.S. Global Competitiveness

The United States maintains the oldest and most dominant position worldwide in venture capital. The lead of the United States in venture capital, combined with the widespread use of technology, has enabled an otherwise mature, wealthy economy to improve its income and standard of living over most other advanced economies. The United States has a unique mix of policy, entrepreneurship, and skilled research that is unmatched worldwide. The most recent statistics show that the United States has the lion's share of total venture capital worldwide at an estimated 72 percent. Also, it is notable that venture capital now supports over 40 percent of the companies entering the publicly traded arena via IPO.

Figure 5-15 shows global trends in venture capital investment in the high- technology sector. Indeed, the data show that Israel is the worldwide leader in venture capital investment in high-technology as a percent of GDP, followed by the United States, Canada, and Sweden. Also of note, Korea, one of the least developed of the OECD countries, has an exceptional venture capital effort in high-technology and health related sectors. Interestingly, the share of venture capital investment in high-technology sectors continues to be small in many European Union countries, Japan, and Australia.

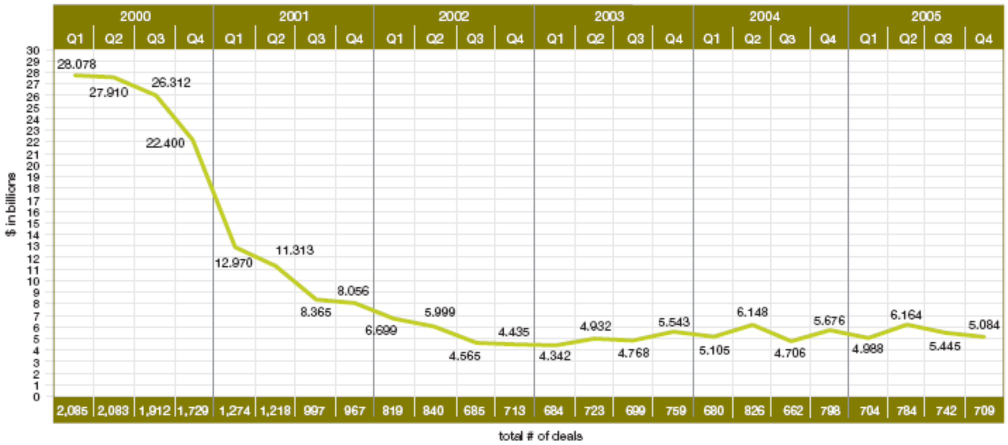
Figure 5-15 Venture Capital Investment and the High-Tech Industry



OECD Venture Capital Database http://www.oecd.org/dataoecd/4/11/28881195.pdf

Figure 5-16 below shows the total equity investments that went in to venture backed companies over the 2000-2005 period. Investments in the fourth quarter of 2005 totaled $5.1 billion in 709 deals, down slightly from $5.4 billion in Q3 2005, but well within the range of investment levels seen over the past 14 quarters. In 2005, venture capitalists matched 2004 by investing $21.7 billion in 2,939 deals. Full-year 2004's $21.6 billion marked the first increase in venture capital investing after three years of consecutive declines. Funding for later stage companies rose markedly in 2005 to $9.7 billion, while the number of companies getting venture capital for the first time increased to 901, continuing a steady year-over-year rise. Both measures were four-year highs.

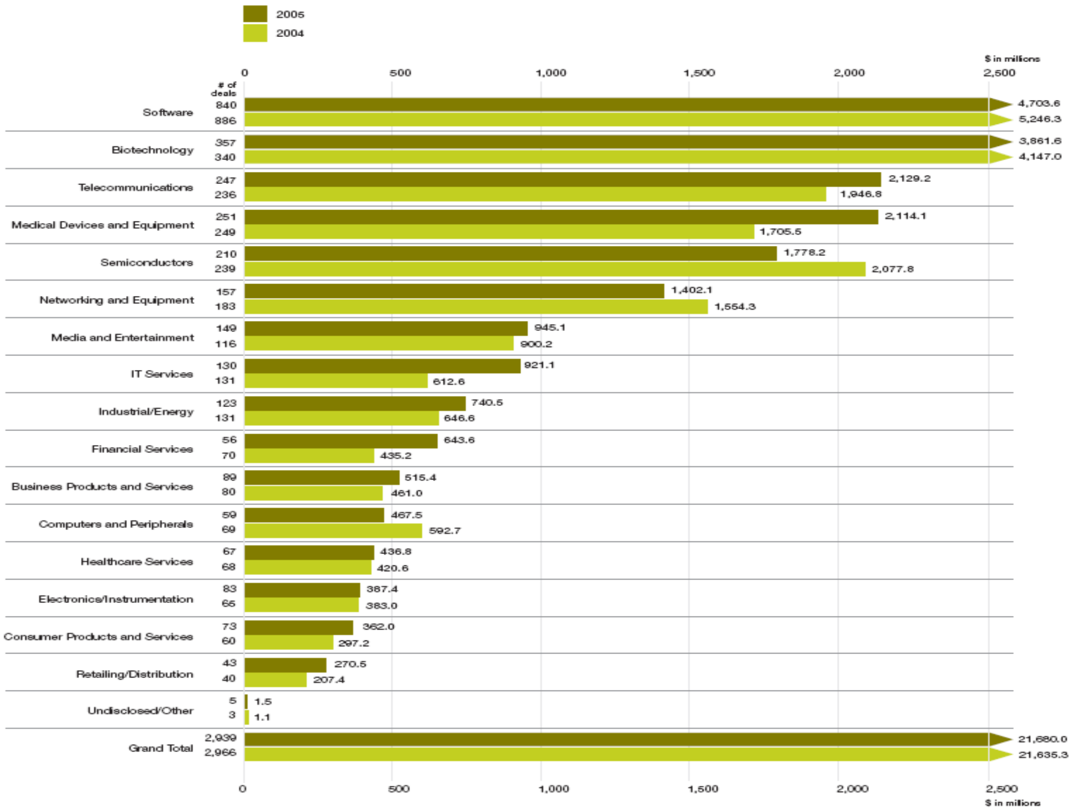
Figure 5-16 Total equity investments into venture-backed companies statistics



Source: Pricewaterhouse Coopers Q4 2005 results

Figure 5-17 shows total equity investments in to venture backed companies by industry in 2004 and 2005. The Life Sciences sector (Biotechnology and Medical Devices industries, together) inched up to a five-year high in 2005 with $6.0 billion in 608 deals compared to $5.8 billion in 589 deals in 2004. Software investments slipped 10% in 2005 to $4.7 billion in 840 deals, yet easily held its position as the largest single industry category for the year, capturing 22% of total dollars and 29% of all deals. The Networking industry continued its slide, ending at $1.4 billion in 2005, an eight-year low point. The Telecommunications industry's Wireless subcategory has become a hot spot. For full-year 2005, 152 wireless-related companies received $1.3 billion, a 24% increase over 2004's $1.1 billion. This increase pushed the Telecommunications category to a three year high of $2.1 billion in 2005.

Figure 5-17 Investments by Industry 2004 & 2005



Definitions of the industry categories can be found on the MoneyTree™ Web site at www.pwcmoneytree.com.

Data is current as of January 24, 2006. PricewaterhouseCoopers and the National Venture Capital Association have taken responsible steps to ensure that the information contained in the MoneyTree Report has been obtained from reliable sources. However, neither of the parties nor Thomson Financial can warrant the ultimate validity of the data obtained in this manner. Results are updated periodically. Therefore, all data is subject to change at any time.

Figure 5-18 shows the regions in which the equity investments in venture backed companies were made. Of the ten regions garnering the largest amounts of venture capital in 2005, three experienced double-digit increases in investing over the prior year. LA/Orange County chalked up a 58% increase in investment levels from 2004, while the Midwest and NY Metro regions both attracted 17% and 12% more dollars, respectively, than in the prior year. During 2005, Silicon Valley dominated the attention of investors as 35% of all US venture capital was invested in the region. Taken together, the top three regions—Silicon Valley, New England, and NY Metro—accounted for 55% of the dollars invested and 49% of the deals reported in 2005.

Figure 5-18 Investments by Region2004 & 2005

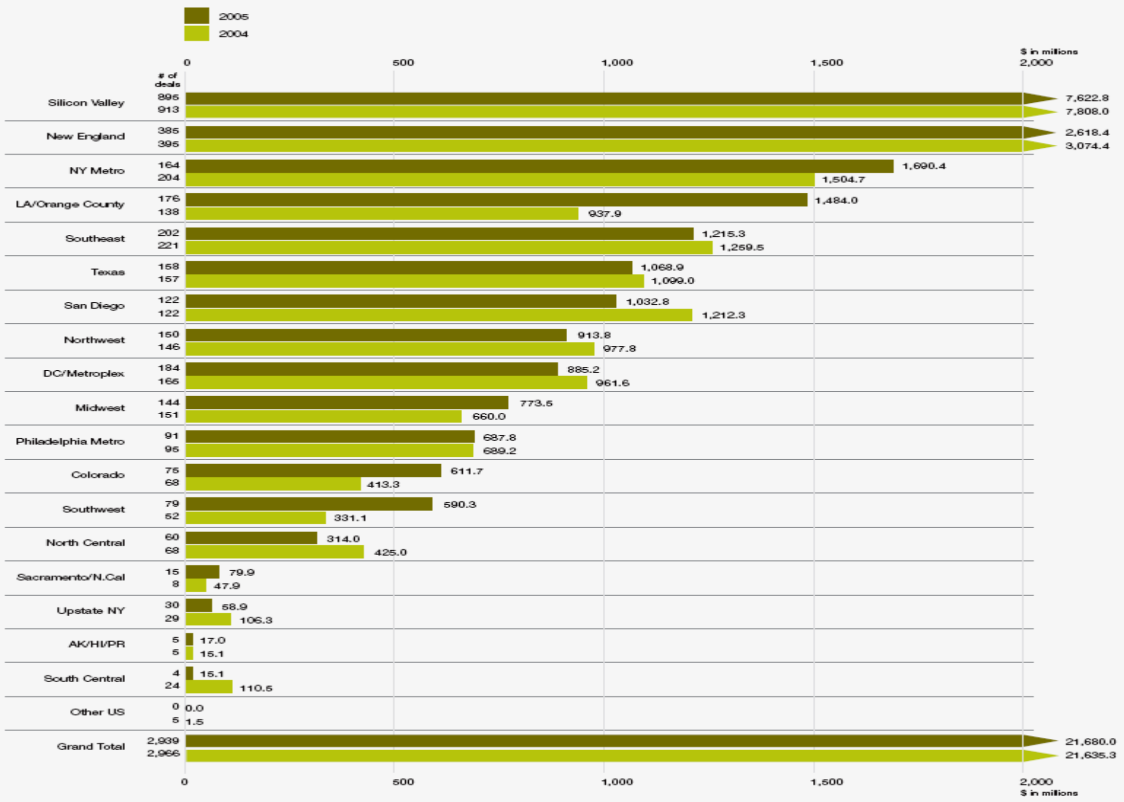


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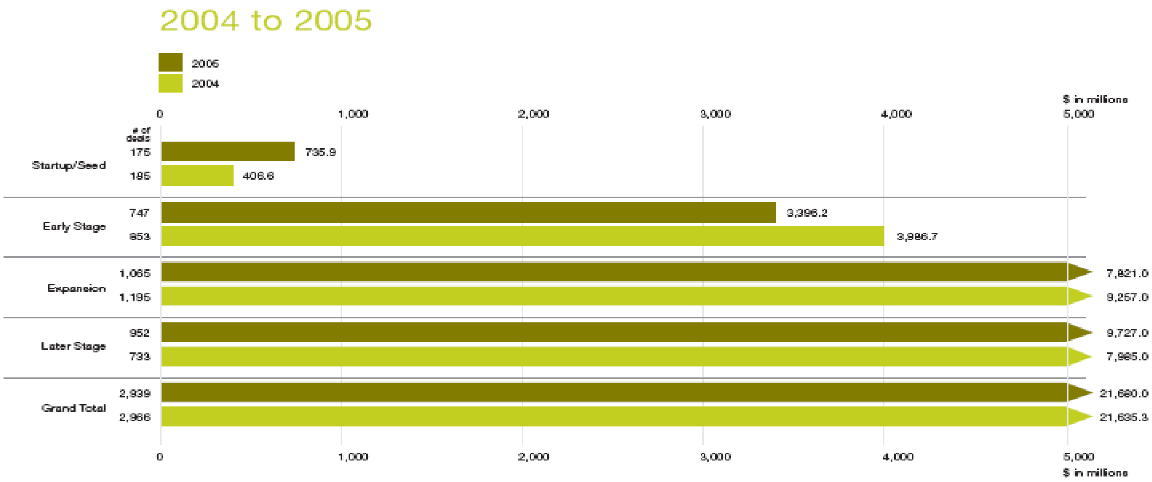
Figure 5-19 shows the equity investments in venture backed firms by stage of development of the firms from 2004 to 2005. For full-year 2005, later stage funding rose 22% to $9.7 billion in 952 deals compared to $8.0 billion in 2004. More notably, later stage accounted for 45% of all venture capital dollars. The continuing shift toward later stage investing over the past five years reflects venture capitalists ongoing support of existing portfolio companies via additional follow-on rounds. Funding for start-Up and early stage companies slipped only slightly to $4.1 billion in 922 deals compared to $4.4 billion in 2004, indicating sustained interest in longer term investment horizons.

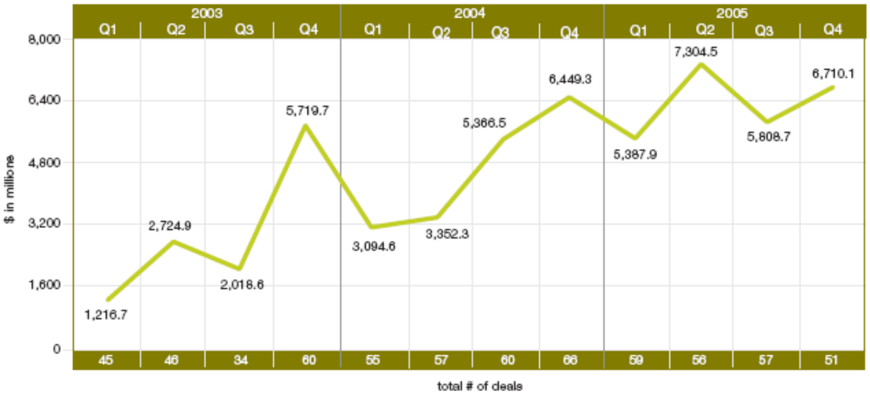
Figure 5-19 Investments by Stages of development



As activity remained focused on opposite ends of the barbell, investing in expansion stage companies fell to its lowest point in nine years: $7.8 billion in 1,065 deals. In 2004, 1,195 expansion stage deals amounted $9.3 billion.

A healthy fundraising climate in the fourth quarter of 2005 capped off the most active year for venture capital commitments since 2001, according to Thomson Venture Economics and the National Venture Capital Association. In the fourth quarter, 51 venture funds raised $6.7 billion. The entire year saw 183 funds raise $25.2 billion, the highest yearly total for venture capital firms since 2001 when 309 funds raised $38 billion. This is shown in Figure 5-20.

Figure 5-20 Funds raised by venture capital firms 2003 – 2005



Source: Thomson Financial Venture Economics/National Venture Capital Association
Note: The figures take into account the subtractive effect of downsized funds.
Disclaimer: Data is current as of February 3, 2006. Data is continuously updated and is therefore subject to change.
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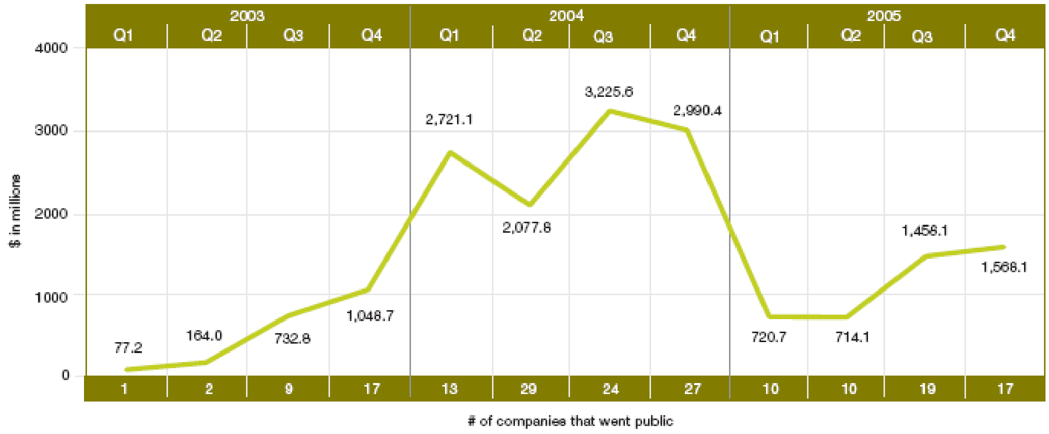
Figure 5-21 Venture backed public offering 2003 – 2005



Source: Thomson Financial Venture Economics/National Venture Capital Association
Disclaimer: Data is current as of January 3, 2006. Data is continuously updated and is therefore subject to change.
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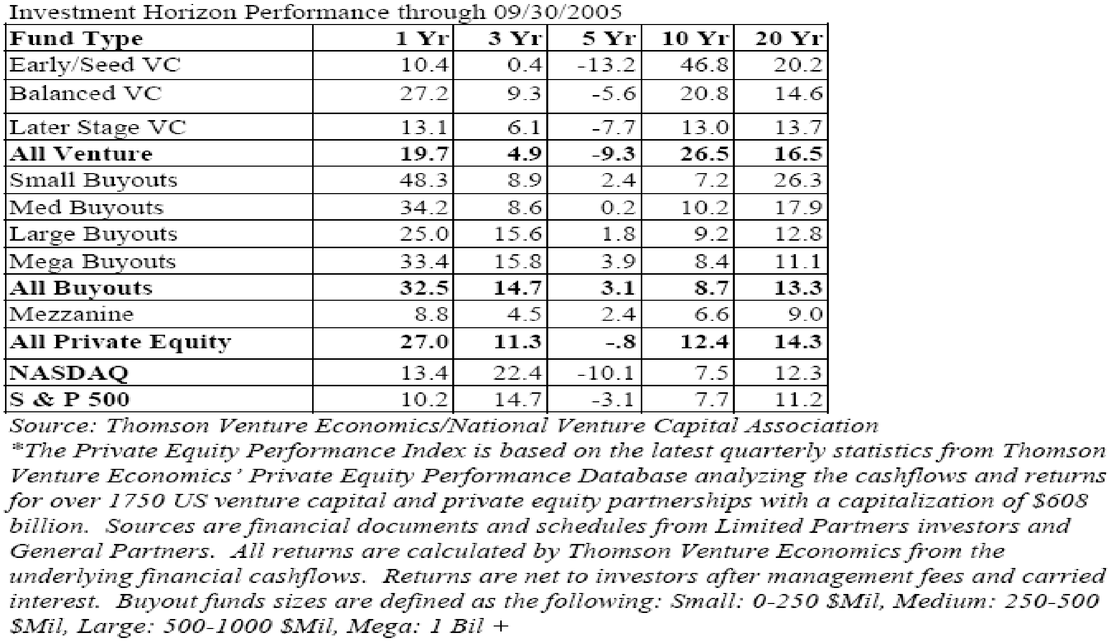
Seventeen venture-backed companies raised $1.6 billion through initial public offerings (IPOs) in the fourth quarter of 2005. The fourth quarter IPO activity mirrored full-year 2005 which was characterized by a significantly weak IPO market. For the full-year 2005, 56 venture-backed IPOs raised a total of $4.5 billion, representing a 40% decline in volume from 2004. This is shown in Figure 5-21.

Table 5-4 Venture Economics U.S. Private Equity Performance Index (PEPI)



Investment Horizon Performance through 09/30/2005

Fund Type	**1 Yr**	**3 Yr**	**5 Yr**	**10 Yr**	**20 Yr**
Early/Seed VC	10.4	0.4	-13.2	46.8	20.2
Balanced VC	27.2	9.3	-5.6	20.8	14.6
Later Stage VC	13.1	6.1	-7.7	13.0	13.7
All Venture	**19.7**	**4.9**	**-9.3**	**26.5**	**16.5**
Small Buyouts	48.3	8.9	2.4	7.2	26.3
Med Buyouts	34.2	8.6	0.2	10.2	17.9
Large Buyouts	25.0	15.6	1.8	9.2	12.8
Mega Buyouts	33.4	15.8	3.9	8.4	11.1
All Buyouts	**32.5**	**14.7**	**3.1**	**8.7**	**13.3**
Mezzanine	8.8	4.5	2.4	6.6	9.0
All Private Equity	**27.0**	**11.3**	**-.8**	**12.4**	**14.3**
NASDAQ	13.4	22.4	-10.1	7.5	12.3
S & P 500	10.2	14.7	-3.1	7.7	11.2

Source: Thomson Venture Economics/National Venture Capital Association

**The Private Equity Performance Index is based on the latest quarterly statistics from Thomson Venture Economics' Private Equity Performance Database analyzing the cashflows and returns for over 1750 US venture capital and private equity partnerships with a capitalization of $608 billion. Sources are financial documents and schedules from Limited Partners investors and General Partners. All returns are calculated by Thomson Venture Economics from the underlying financial cashflows. Returns are net to investors after management fees and carried interest. Buyout funds sizes are defined as the following: Small: 0-250 $Mil, Medium: 250-500 $Mil, Large: 500-1000 $Mil, Mega: 1 Bil +*

Private equity funds continued to outperform the public markets across all time horizons in the third quarter of 2005, according to Thomson Venture Economics and the National Venture Capital Association (NVCA). Long term performance in both venture capital and buyouts remained steadfast, enjoying 20 year returns of 16.5% and 13.3% respectively. For the ten year horizon, venture capital returned 26.5%; buyouts returned 8.7%. Short term performance was considerably more volatile with one year venture capital returns jumping from 7.8% in Q2 2005 to 19.7% in Q3 2005. For the same one year horizon, buyout funds returned 32.5% in the third quarter compared to 26.9% in the second quarter.

The IPO market saw a relative spike during the third quarter with 19 venture-backed companies going public. The venture-backed mergers and acquisitions market also produced strong results with a greater number of companies being acquired at higher values. The exit markets in the third quarter provided general partners a larger arena to exit their investments and thus provide greater distributions back to limited partners. Five year performance for venture capital still is posting a negative return of 9.3% for the period ending 09/30/2005. This continued negative return is due to the remaining losses taken by firms that made investments in the closing stages of the Internet bubble era.

5.4.1.3 Business Angel Investing Groups in North America

Angel investing has long been an important source of financial support and mentoring for new and growing businesses bridging the gap between individual (friends and family) and institutional venture capital rounds of financing. Over the past several years, this sector of the private capital market has been formalizing in response to both growing demands and complexity.

According to research conducted by Jeffrey E. Sohl at the University of New Hampshire's Center for Venture Research, there were approximately 50 formal business angel groups in the United States five years ago. He now estimates that there may be as many as 170 formal and informal organizations located throughout leading technology and business regions in the US and Canada. These groups have several characteristics: loosely to well-defined legal structures; part-time or full-time management; standardized investment processes; a public face usually with a Web site and public relations activities; and, occasionally a traditionally structured venture capital/angel investing fund.

The number of organized groups has grown in response to several factors:

- A desire to attract better deals and generate higher returns than angels acting alone;
- The growth of venture capital funds and the attraction of venture investing;
- A widening "capital gap" between individual and institutional venture capital investors that has created a need and an opportunity for pooled investments;
- The legal and economic complexity of these investments;
- A large increase in the number of self-made, high net worth individuals who want to be more involved in their alternative asset management;
- The volume of deal flow;
- Social camaraderie among investors.

As a result, investment screening is fairly consistent across groups. Specific organizational and legal structures, however, remain varied. Most groups developed their own organizational structures and processes independently and have recently begun to discuss and debate best practices.

For entrepreneurs and other investors, the net results of this change are mostly positive. Although the models of business angel groups continue to evolve, these groups are generally better financed than ad hoc groups of individual investors. These groups provide an extended network that benefits both funded companies and co-investors by providing greater due diligence, operational support and domain expertise. Business angel groups can also provide a key source of qualified deal flow for venture firms; as well as provide intermediate capital for companies with financing requirement levels between individual investors and institutional venture capital.

5.4.2 Financing in Asia

5.4.2.1 Asia Venture Capital Activity Overview

2005 has been an active year for Asia private equity. The world's leading buyout and venture firms continue to pour capital into Asia. With Asian exits making headlines, fundraising hitting new highs, and Asian economies setting the pace for global expansion, Asian's attraction to global investors should come as little or no surprise.

5.4.2.2 Sources of Funds Raised in Asia

Overall, the Asian private equity pool continued its rapid growth, surpassing US$111.3 billion in total funds under management by mid-year 2005 vs. US$106.4 billion at FYE 2004 and US$976 billion at FYE 2003. The geographical distribution of the fund in Asia for Year 2004 is shown in

Table 5-5. Private equity firms across Asia raised more than US$6.4 billion in the first six months of 2005 versus US$11.5 billion in 2004. Although Japan continues to lead in the capital pool of close to US$30 billion, the amount of fund raised in 2005 by Japan is dwarfed by the pan-Asian funds. Hong Kong maintains its position as the largest private equity and venture capital pool outside Japan with US$27 billion. Yet investment in local Hong Kong is proportionally insignificant.

The main source of venture capital in Asia comes from corporations funding, which accounts for one third of the total contribution of funds. Banks, pension funds and insurance companies contribute about the similar amount of between 17% and 19% to the pool of capital. The sources of venture capital in Asia are shown in Figure 5-22.

Figure 5-22 Sources of Venture Capital

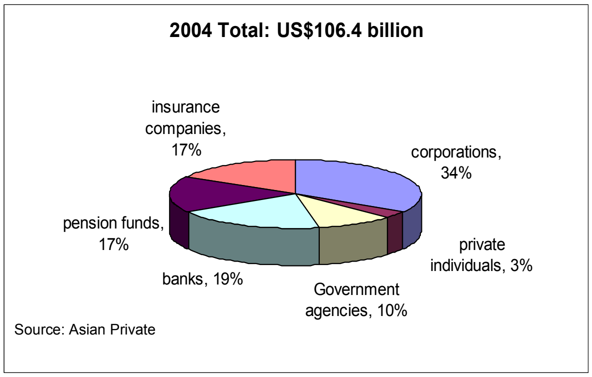


Table 5-5 Geographical distribution of Venture Capital in Asia 2004

Geographical Distribution of Venture Capital in Asia 2004

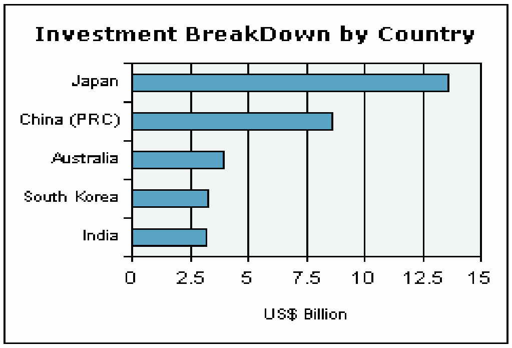
Country	Capital under management (US$ million)	Percent of total	Number of funds/firms	Percent of total	Investments made (US$ million)
Australia	6,600	7.1%	182	11.5%	2,200
Bangladesh	-	-	-	-	-
China	7,330	6.9%	249	15.7%	2,063
Hong Kong	27,530	25.9%	177	11.2%	252
India	3,620	3.4%	86	5.4%	1,363
Indonesia	150	0.1%	28	1.8%	71
Japan	29,780	28.0%	268	16.9%	7,059
Korea	9,340	8.8%	167	10.5%	1,560
Malaysia	972	0.9%	46	2.9%	760
New Zealand	746	0.7%	46	2.9%	250
Pakistan	-	-	-	-	-
Philippines	250	0.2%	19	1.2%	104
Singapore	11,542	10.8%	121	7.6%	1,291
Sri Lanka	10	-	-	-	-
Taiwan	6,640	6.2%	168	10.6%	49
Thailand	645	0.6%	20	1.3%	239
Vietnam	228	0.2	9	0.6%	4
Total	$106,383	100.0%	1,586	100.0%	

Source: AVCJ

5.4.2.3 Private Equity Investment in Asia

Overall private equity investment across Asia fell as regulatory jitters in China and Japan slowed down the investment activities. The rest of Asia still maintains a healthy investment activity though. Japan and China continue to draw the most investment in Asia as shown in Figure 5-23.

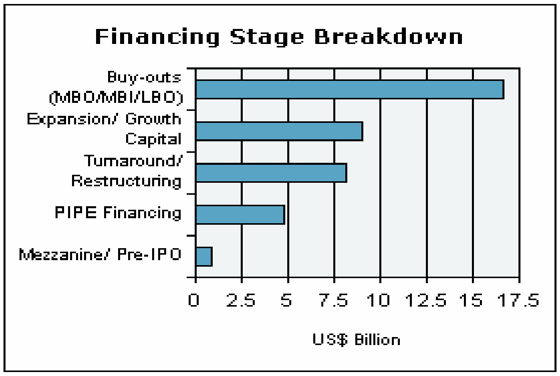
Figure 5-23 Investment breakdown by country



Source: Asia Private Equity 300

As in the past, most of the investment is infused into buy-outs (34.5%) and turnaround/restructuring (25%). Expansion and growth stage and PIPE transaction remain attractive and draw around 22.1% and 15.1% of the total investment. The breakdown by financing stage is shown in Figure 5-24.

Figure 5-24 Financing stage breakdown in Asia Venture Capital



Source: Asian Private Equity

Private equity investment was focused mainly on traditional industries such as financial services and transportation, which in total accounts for more than 60% of the funding. High tech industry in information technology and telecommunications receives about 20% of the funding. Only in China and India, more investment goes into information technology industries.

5.4.2.4 Asia and United States Venture Capital Comparison

Asia VC differs from the United States in three important ways:

- Asia VC invests mostly in financial services segments while US in high technologies area
- Main source of VC funding in Asia comes from Corporations while US from pension funds
- Most Asia VC funding goes into expansion capital and buyouts while US to growth stage

5.4.2.5 Trends in Top Five Asian Countries Regarding Investment Made

Based on the investment made numbers shown in

Table 5-5, the venture capital trend in the top five Asian countries in terms of investment volume are discussed.

Japan

Investment by the venture capital firms in Japan can be classified to two types:

- investing the firm's own capital fund, and
- investing a fund raised through an "investment partnership" (in this case, the venture capital firm plays a role of fund manager by contract.)

Although Japan leads Asia in the amount of VC funded, yet in terms of GDP, the amount of VC funding that goes into high technologies does not compare to Korea. In 2004 and first half of 2005, the majority of investment activity was in the buy-out and turnaround/restructuring sectors. These sectors accounted for about 40% of the 84 deals with value disclosed in 2004 and 8 of the 28 deals with value disclosed so far for 2005. The trend seems to have reversed back to turnaround restructuring investments from buy-outs.

Australia

Although fundraising in Australia has shown sign of slowing down in 2005, fund sizes have continued to grow. Buyouts and expansion capital dominated in 2004 both in terms of the number of deals and amount of money invested. In 1H 2005, there is indication that there is a change in the trend from buy-out and expansion to turnaround deals. Healthcare was the most popular sector in terms of number of deals throughout 2004 and 1H 2005. Leveraged buy-out bringing a company from public to private has shown increasing popularity among private equity funding in Australia also.

China

In 2005, private equity investments in China businesses was focused on information technology industries, accounting for over 60% of total investment in the whole industry, and its investment case ratio topped 66%. Especially, the investment in Internet industry reached $203 million dollars, exceeding that in the telecom industry. Strikingly, the number of deals closed as of the H105 had gone beyond that the whole year of 2004. By region, Beijing received the most of the amount invested and the number of deals, followed by Shanghai. Beijing received US$379million investment, more than the aggregate of investments in Shanghai and Jiangsu. As for the number of deals, start-up and growth stages were most active in 2005, accounting for 36.5% and 32.2% of the total deals. In terms of the amount invested, growth stage enterprises attracted the majority of investment.[21]

It is predicted that foreign VCs will become more active and the investment in 2006 will be expected to hit another new high after a historical new high VC-backed IPOs and M&As being 17 and 12 respectively in 2005 according to a survey conducted by zero2ipo.com.[21] Among these IPOs and M&As, VC firms obtained fruitful returns as a result of their investing in their portfolios, such as listed companies of Baidu.com, Wuxi-based Suntech, and Focus Media.

Korea

The effort made by Korean government, which lifted restrictions on domestic buyout funds at the end of 2004, stimulated the local private equity market. In the twelve months in 2005, numerous successful exits and landmark leveraged buyouts and investment being made.

Venture capital in Korea is invested through two channels established by the 1986 SME Establishment Assistance Law: venture capital firms (VCFs) or limited partnership funds (LPFs). A VCF must be registered with the SMBA as a corporation that provides capital primarily to start-ups. It is eligible for government assistance in the form of low-interest loans, equity funding and tax benefits, but must invest a certain share of its portfolio in small firms less than seven years old. In the 1990s, VCFs have evolved from primarily lending operations to mostly making direct equity investments in enterprises. Korean venture capital policies have directed financing to high-technology industries. The rapidly expanding information and communications technology (ICT) sector (i.e. computer software, Internet, information systems) has absorbed most new equity capital in recent years.[22]

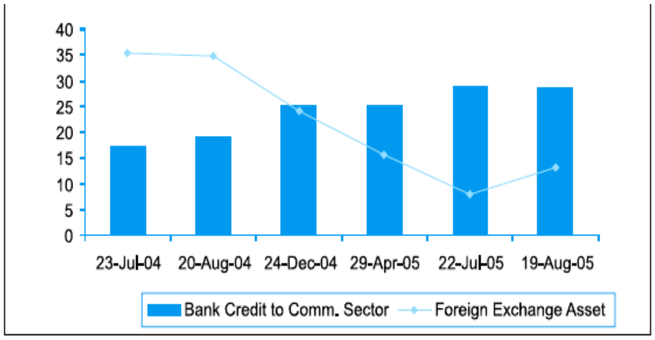
The Korean government accounted for about half (52%) of total shares in VCFs in 2001, the chaebol provided another 40%, while financial institutions such as banks and securities firms supplied the remainder. The government -- through direct funding and indirect funding of VCFs -- was also the largest source of funds raised by LPFs, accounting for almost 35%.

India

In 2005 India continues to see an increase in total private equity capital investment. In addition to the traditional sectors such as India's export oriented IT and outsourcing, private equity investors expand to include financial services, manufacturing, media and other services such as construction. The annual growth in money supply was 16.8% as of 30 September 2005 as shown in Figure 5-25.[23] There is a discernible change in the sources of the rise in money supply. Bank credit to the commercial sector emerged as the main engine of growth as against foreign exchange asset with the banks in the previous year. Credit to industry, housing and real estate continues to record impressive growth.

The secondary equity markets rallied strongly during September 2005. Both BSE's Sensex and NSE's Nifty reached an all time high of 8487 points and 2567 points respectively. This is partly attributed to the strong investments by foreign institutional investors (FIIs). However, the secondary equity market has witnessed some volatility recently. The protracted upward movement of secondary equity market indices has prompted RBI to advice banks to track the end use of loans taken by companies. 23

Figure 5-25 Sources of Money Supply in India



Source: ADB India Economic Bulletin

5.4.2.6 Bank Financing in Asia

Bank financing is not a popular mean of acquiring capital in Asia, especially for those small businesses in the developing countries. How the firms usually get financed is shown in Table 5-6.

For the SMEs in Asia, less than 20% of the firms receive the investment from banks. Most of the firm, 35% in East Asia & Pacific, and more than 55% in South Asia, receive the new investment from internal funds. Sometimes, working capital is financed with credit from suppliers or clients.[24]

Table 5-6 How SME gets the new investment in Asia

Country	New investment from internal funds (%)	New investment from banks (%)	Working capital financed with credit from suppliers or clients (%)
East Asia & Pacific	35.62	17.29	6.71
South Asia	55.32	18.88	6.28
Bangladesh (2002)	59.85	29.71	4.17
Cambodia (2003)	20.24	2.87	1.99
China (2003)	15.24	20.37	2.27
Indonesia (2003)	41.89	16.34	3.54
Malaysia (2002)	42.79	33.58	14.3
Nepal (2000)	57.04	23.88	..
Pakistan (2002)	58.12	6.49	4.63
Philippines (2003)	57.96	13.29	11.42
Sri Lanka (2004)	50.02	15.3	10.04

Source: Enterprise Survey, World Bank

Even in developed countries, such as Japan, there seems to be a decline in lending to SMEs, which makes firms more difficult to obtain capital.[25] SMEs depend on borrowing for the majority of their financing; yet the proportion of enterprises unable to borrow easily increases as the number of employees decreases. SMEs face worse terms of borrowing than large enterprises, such as higher interest rates and greater need for guarantees (personal collateral). A factor identified as a major cause of the greater financing difficulties encountered by SMEs compared with large enterprises is the "asymmetry of information" arising between lenders and borrowers, which makes it difficult for lenders to judge the quality of a borrower and accurately monitor its behavior after receipt of a loan.[25] Easing this asymmetry of information is essential if SMEs are to be helped to raise funds more smoothly.

Overview of an Asian Successful High Tech Park – Hsinchu Science Park

In 1980, Taiwan government had a vision of creating a Silicon Valley of the East. The goal was to create a framework for private-sector developments that would facilitate, promote, and discipline them, in keeping with Taiwan's industrial development strategy overall. It set out to create its core high-technology capabilities within the public sector, and then to use theses institutional creations, such as the Industrial Technology Research Institute (ITRI), as the engines of rapid diffusion of technological capabilities to the private sector[26] The Park being government owned offered attractive terms and a range of taxation benefits and allowances to induce firms to settle there. Since the establishment of HSP, the government has invested S$1,679 million on park infrastructure and facilities. The park was located near two leading technical universities, National Chiaotung and Tsinghua to gain better access to the cutting edge technology that is under development. [27] A total of 384 high-tech companies had been established in the park by the end of 2004, a total of 632 hectares had been developed for the HSP proper, plus an additional 141 hectares for the Jhunan Park. During its 24 year history, the HSP has focused both on research and production, thus profoundly impacting the local economic development and giving the HSP an international reputation and establishing it as a model imitated by other countries. HSP's focus has expanded from the original semiconductor industry to include telecommunications, optoelectronics, biotechnology and other high technology industries.

Funding

Sources of capital for the Park companies totaled US$ 32,244 millions (cumulative number) in December 2004. Most of the capital (88.6%) is from private sources. Although VC in Taiwan is not as active as other major players in Asia, and the total VC investment in 2004 was only US$ 49 millions as shown in

Table 5-5,[28] other private capital is still widely available to the firms. Foreign investment in the area accounts for around 9.5% and government 1.9%. The government funding although seems small, it plays a significant role in promoting the growth of a fledgling company.

R&D Funding

"Recognizing R&D as the basis for the sustainable development of high technology, HsinChu Park Administration presents "Innovative Product Awards", "R&D Accomplishment Awards," and grants for "Innovative Technology Development Projects," to encourage R&D and the globalization of companies in the Park."[29] The "Innovative Product Awards" was created to stimulate creative ideas for new products. In 2004, nine new products with total subsidies of US$135 thousand were awarded in this category.

The "R&D Accomplishment Awards," introduced in 2003, encourages companies to apply for patents for R&D protection, thus upgrading their technical level to improve overall industry development. Six companies were given this award in 2004.29

The "Innovative Technology Development Projects" scheme was established to improve the technological competitiveness of Park companies. In 2004, 39 research projects were subsidized with close to US$3.2 millions, representing 22% of the total research budget of the scheme. 29

Regarding new investment, 48 applications from new companies were approved in 2004, representing total capital of US$1,290 million. Meanwhile, regarding applications for increased investment, 55 companies applied for investment, totaling US $2,159 million.

Exit

Ninety seven Park companies were listed on the TAIEX and OTC markets at the end of 2004. Furthermore, Taiwan Semiconductor Manufacturing Co., Ltd. (TSMC), United Microelectronics Corporation (UMC), and Macronix International Co., Ltd., were also listed on the American Depository Receipts (ADR) Market.

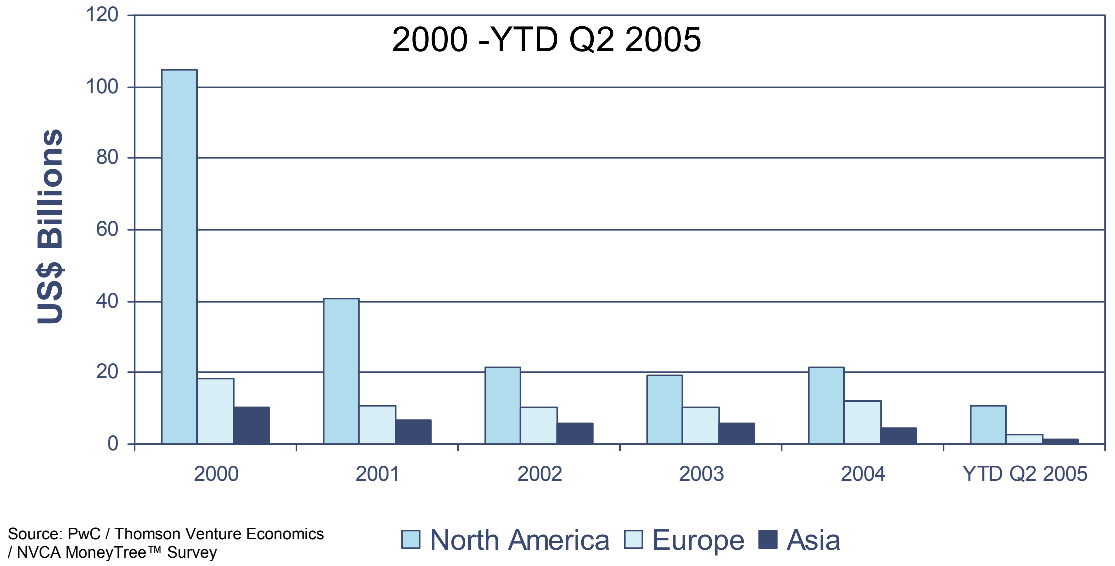
5.4.3 Financing in Europe

5.4.3.1 Sources and Destinations of European Financing

Similar to the United States, Europe has a well developed financial services industry that provides a wide-range of financing products to Small and Medium Enterprises. Also similar to the United States, banks are the largest provider of financing to SMEs. Venture Capitalist only represents 2% of all funding obtained by SMEs. [30]

While venture capital is not the most common form of financing for SMEs, it does play a unique role in financing high-risk technology based firms, which are often based over by traditional forms of financing. [31] The European venture capital industry is second only to North America in size. But in many respects in aggregate, has been more stable than the North American market not suffering the same boom and bust dynamics that best North America around 2000. This is shown Figure 5-26 below.

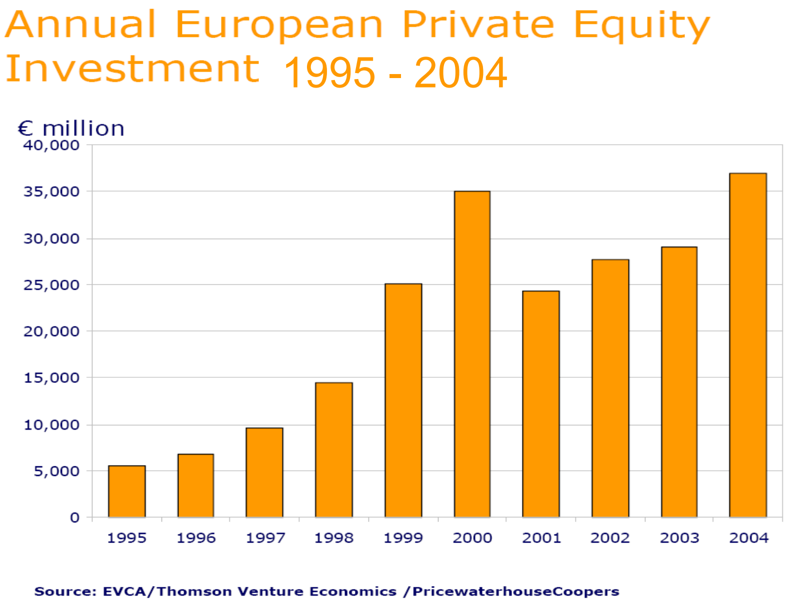
Figure 5-26 Global Venture Investment Activity



Source: PwC / Thomson Venture Economics / NVCA MoneyTree™ Survey

In fact, the European private equity market has been relatively stable over the last five years. European equity boomed in 2000 and dropped off in 2001, only to quickly recover to volumes equal to the peak period in 2000. This is shown in Figure 5-27.

Figure 5-27 Ten Year Trend in European Private Equity

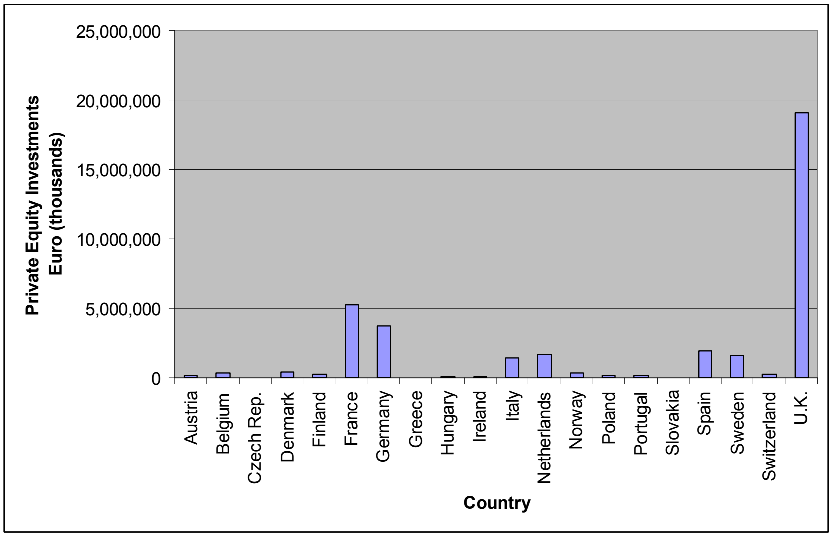


Source: EVCA/Thomson Venture Economics/PricewaterhouseCoopers

Some of these differences can be attributed to the fact that, unlike the United States, which operates as one single political and economic bloc, Europe, despite the formation of the European Union and the single currency (managed by a European Central Bank) is still a collection of distinct countries that operate under different political and economic conditions.

Figure 5-28 shows that venture capital amounts vary considerably by country. The United Kingdom actually makes up over 50% of all venture capital investments by value (United Kingdom 19 billion/ Europe 36.9 billion Euros) and is by any measure the most successful venture capital country in Europe.[32]

Figure 5-28 2004 European Venture Capital Investment Activity by Country



While there are some similarities between venture capital in the United States and Europe, there are more differences and the differences are significant. European venture capital tends to have a greater focus on buyouts which represent 70% (25.7 billion Euros) of funds invested. In the United States, later stage financing (buyouts) represents only 45% of total venture capital and private equity funding. In Europe, start-up investments represent 13% of total venture capital and private equity, whereas in the United States, this segment represents 17%. In Europe, Expansion funding Is 21% versus 36% in the United States.[33]

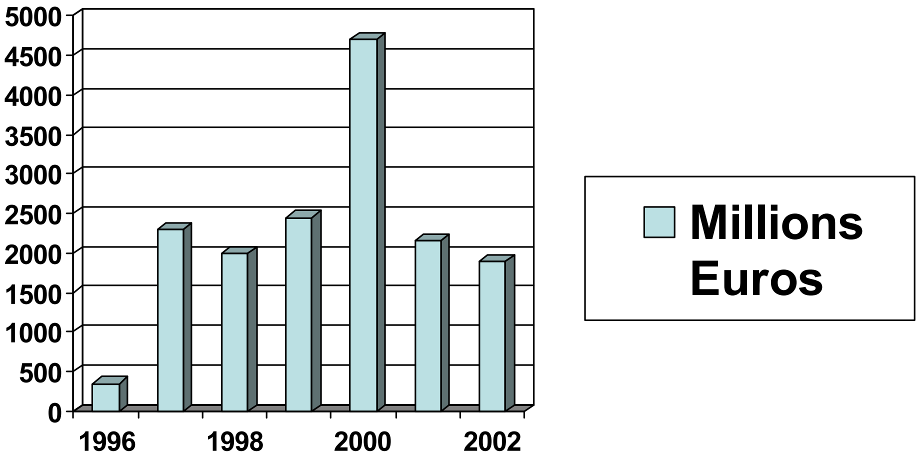
Another significant difference between Europe and the United States is the industries that are targeted by the respective venture capitalist. In the United States, venture capitalists tend to target technology industries, while the Europeans tend to target traditional mainstream business segments. In 2004, consumer-related businesses accounted for the highest proportion of amount invested at 8.5 billion Euro (23%), followed by Other Services with 5.1 billion Euro (14%) and Communications with 4.9 billion Euro (14%) and Communications with 4.9 billion Euro (13%)33

In contract, the United States saw the majority of venture capital investments directed toward technology in 2004. The industry investment breakdown was as follows: Biotechnology accounted for $1.069 billion (21%), Software $$1.037 billion (20%), Medical Devices and Equipment $613 million (12%) and

Telecommunications $517 million (10%). Clearly, venture capitalists in the United States favor technology industries.[34]

In Europe, banks continued to be the largest contributor to funds raised at €5.1 billion or 22% of total funds raised but were down from €5.4 billion in 2003. Pension funds came second with 19% or €4.5 billion of total funds raised, down on 2003's figures of €4.9 billion. 35 By contrasts, in the United States, public and private pension funds are the main source of funds for venture capitalists contributing 40% of the total followed by financial and insurance companies (23%) and endowments and foundations (21%).[36] Like the United States, corporate venture capital plays a significant role in the European market. However, in absolute terms, corporate venture capital makes up a very small percentage of total venture investment (2 billion Euro vs. 35 billion Euro).[37] This can be seen in Figure 5-29 below.

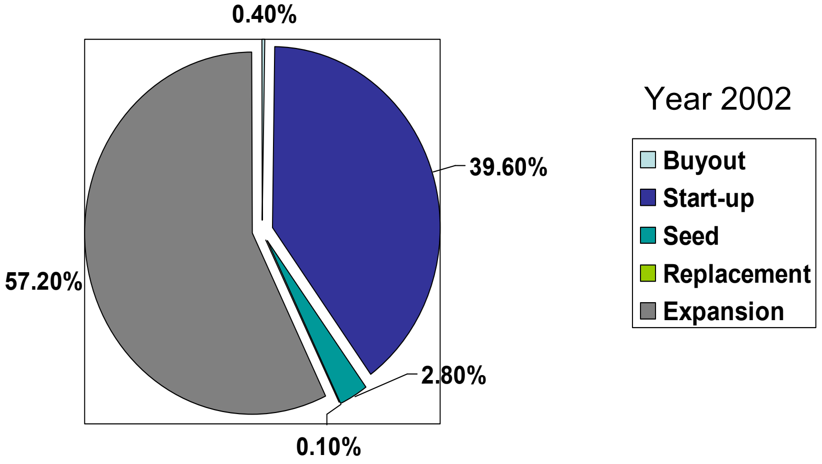
Figure 5-29 Funds Invested by Corporations in European Private Equity



Source: www.evca.com

However, the industry focus of corporate venture investing in Europe is quite different from the main street investors. Corporate venture capitalists have a much greater focus more on start-up and expansion stage financing (See Figure 5-30).[37] This can be explained by the fact that corporate venture capitalist are seeking to gain access to new promising technologies and using newer companies as a source of innovation.

Figure 5-30 Stage of Distribution of Corporate Investment



Source: EVCA

In conclusion, European venture capital is highly developed but fragmented by country, where each country performs differently. UK has the largest and most successful VC industry in Europe.

5.4.3.2 European and United States Venture Capital Comparison

European VC differs from the United States in three important ways:

- European VC: mainstream business segments whereas US VC invests primarily in the technology segment.
- In Europe, Banks are the main investors to VC funds whereas in the US pension funds are the main investors.
- Most European VC goes into expansion capital and buyouts.

5.4.4 Financing in Latin America

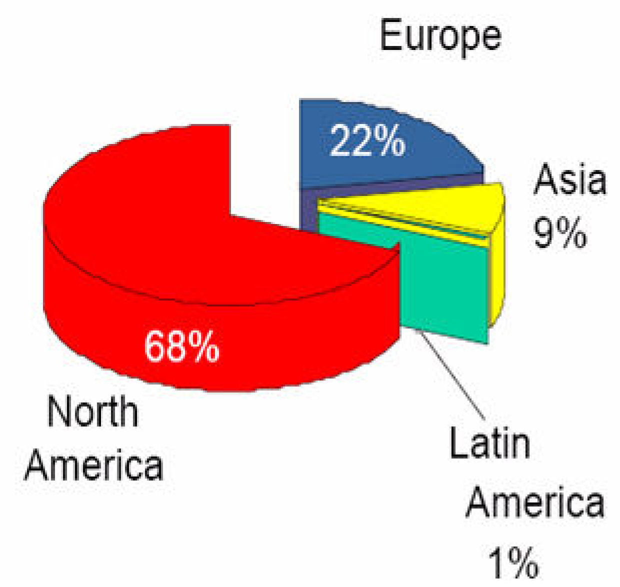
5.4.4.1 Private Equity in Latin America

Private equity has a small but important place within Latin America firm financing. This subsection provides an overview of the Latin American and specifically Brazil's private equity and venture capital market. While highlighting the significant challenges facing the Latin American equity market, it also shows significant opportunities that exist.

5.4.4.1.1 Market distribution

In terms of the global private equity market, Latin America makes up a small percentage, around 1% of the total funds raised, see Figure 5-31. This is largely due to the lack of a domestic private equity market and the challenges faced by private equity in the market place, namely the lack of a viable exit strategy. Foreign funds continue to dominate the Latin America private equity market, though domestic funds are beginning to develop, driven largely by government involvement

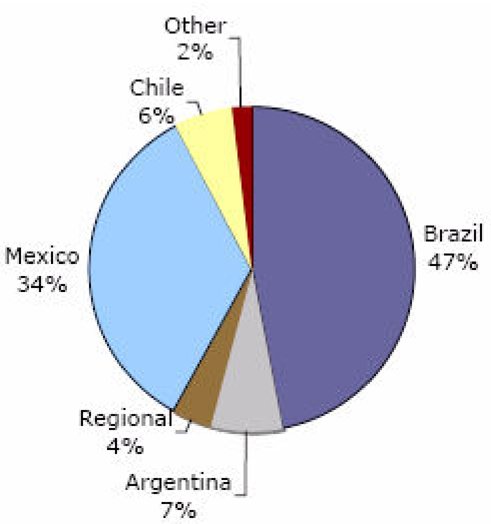
Figure 5-31 Global Private Equity Investments 2002



Source: Private Equity and Venture Capital in Mexico.

Regional distribution remains relative stable with Brazil receiving the lion's share, see Figure 5-32. The implication is that despite the challenges faced by the region and Brazil, there is solid interest in investing in the Brazilian economy. This is important for Sapiens Parque, because of the critical nature of private equity required for high growth firms.

Figure 5-32 Percentage of Funds Raised by Country in 2004

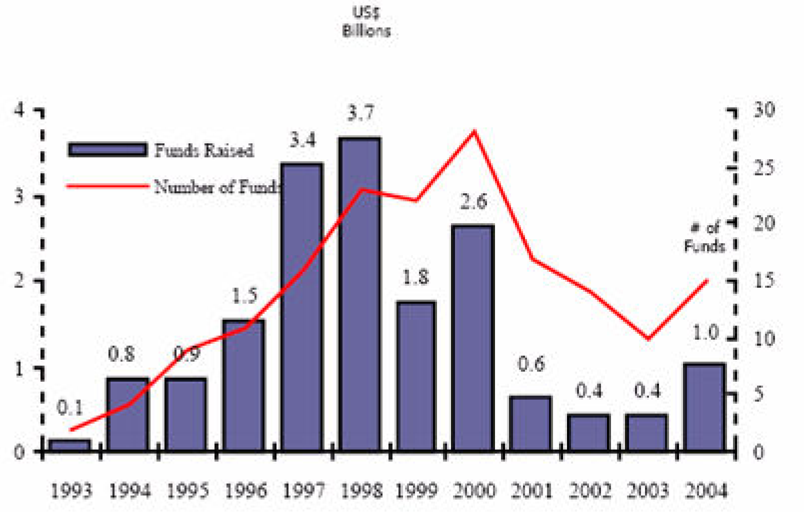


Source: Latin American Private Equity, Taking Stock

5.4.4.1.2 Regional Trends

Prior to the 1990s, Latin America had virtually no private equity deals[38]. This changed rapidly (Figure 5-33) with the investment of US $20 billion in Latin American private equity funds between 1996 and 2004. Large national firms with strong market positions were a powerful lure and the regional equity market, in many cases fueled by foreign investors, jumped in with both feet. The volatility that existed inside and outside of Latin America exerted a large influence over the size and number of funds raised.

Figure 5-33 Private Equity Investment in Latin America



Source: Latin America Private Equity, Taking Stock

The upward trend that began in 1996 was driven largely by the Internet frenzy spilling over from the US Internet bubble. Over this time frame, 1995 to 1999, 60 funds existed in Brazil. An un-official total of US$4.71 billion were raised between 1997 and 1998[39]. The majority of these funds saw large negative swings in value with the collapse of the Internet bubble and the currency devaluation crisis. Despite the large increase in funds raised in 2004 (Figure 7) to US$1 billion, only about US$630 million of it had been invested in firms. Post bubble, many fund managers had trouble raising additional funds, just as the existing funds had reached the end of their 10 year standard life. This resulted in unsuccessful fund managers exiting the market leaving stronger and more experienced managers in the market place. Not only has this improved the level of talent in the region, but the remaining managers are also seeing a healthier environment for exits.

5.4.4.1.3 Exit Strategy

Looking back, a key lesson learned is the importance of a formal and realistic exit strategy. The typical venture capital exit strategy of IPO is made more difficult by the underdeveloped nature of these markets in Latin America. For example, in 2004, there was a total of five IPO's that generated US$341 million. The result was that most successful exits did not occur through IPO's. Exit strategies are further complicated by investments in family owned businesses. The lack of succession planning and the perception that the business is the only source of family wealth for the future tends to act as a gate for exit. Faced with this challenge, many funds are turning to mezzanine debt rather than equity as an exit strategy. Though the returns on these kinds of investments are lower, investors wary of the pitfalls associated with family owned firms see greater stability with these types of investments

5.4.4.1.4 Brazil

In the following section we review the history and background of the Brazilian private equity market. We cover the history of some of critical funds, initiatives used to strengthen the industry, the shift towards defensible technologies and a comparison to US venture/private equity, government involvement that leads to the chapter conclusion.

As mentioned above for all Latin America, there was no private equity deals invested though a limited partnership in Brazil priori to the 1990s. In 1974 BNDES, the National Economic and Social development Bank formed three investment companies to capitalize Brazilian companies. These are known as BNDESpar, whose goal is to "strengthen the assets and financial structures of…develop capital markets…with the aim of making these markets important mechanisms for private companies to raise funds[40]. Typically BNDESpar's holdings are temporary in duration, less than five years[5541]. Additionally, their ownership position has been a minority stake, with up to 33% of total capital being mostly in preferred shares[42]. BNDESpar was focused on creating national industries, and its investments reflected this attitude.

In 1994, Brazil saw it's first private equity fund raised that focused solely on the Brazilian market : GP Investimentos (GPI), founded by the partners of the largest investment bank in Brazil, Banco Grantia. Starting in 1979, the partners had been investing their own capital in companies acquired by the bank. When this bank was sold to CSFB in 1998, the former partners continued to run their own funds. With several successful acquisitions under their belt GPI was able to attract capital from limited partners.

For three years, 1996 to 1998, the private equity industry focused on buyout deals of large traditional sectors such as, telecom, transportation, cable television and retail. This began to change with the devaluation of the Brazilian currency and the focus shifted to the Internet. Private equity funds were looking to replicate the large gains seen in the US. There was a significant challenge to this with the lack of IPO activity; Brazil had only two exits while Mexico had one. The underdeveloped secondary market and the lack of macro economic stability were the main causes of this.

It was during this same time frame, between 1995 and 1998, that large national funds began to appear; CVC/Opportunity raised the first US$1 billion dollar fund[43]. This fund was raised to specifically focus on the Brazilian privatization process. Overall, Brazil saw an increase of 343% from 1995 to 1998, with US$3.7 billion raised. All of this changed when the real was devalued. Fund raising plummeted, decreasing to 47% of the 1998 total. However, with the successful introduction of the StarMedia and El Sitio IPO's, venture capital began a positive fund raising trend. US$194 million were raised in 1999, and this increased to US$1.1 billion in 2000 (42% of the total)[44].

Just as the wave of private funding was reaching its zenith, several brokers got together and founded SOMA, an electronic exchange intended to bring Brazil's over the counter trading to a transparent market place. SOMA did see some success as a vehicle for pricing and allowing fund participation in electronic power and telecom spin offs. However, with the wave of privatizations slowing, the exchange stalled, largely because it could not attract new listing and investors. However it does remain the only viable alternative vehicle for market based exists, though its growth has stalled with the lack of new listings and new investors[45].

5.4.4.1.5 Pension Fund Investment

As with the discussion above concerning the US, we have seen that pension funds are key drivers of the venture capital industry. The large amounts of capital readily available leave them as ideal partners for equity investment funds. In Brazil, prior to 1997, pension funds were unable to invest in private equity funds. With the move towards privatization, Brazilian funds started to become very active in the process. The investment was by and large made directly, through the formation of consortiums[46]. In 1997 with the change in the law forbidding investment in private equity, several funds made very small cautious forays into private equity funds, although this investment was limited to mutual funds. Two years down the road, Brazilian pension funds had invested only US$450 million of the US$52 billion that these pension funds controlled[47]. It is critical to the long-term viability of regional and Brazilian venture capital that pension funds are convinced to invest in private equity funds more aggressively, and that that investment be allowed to take place outside of mutual funds. Few other sources of capital are likely to have the amounts of necessary to fund high growth firms.

5.4.4.1.6 Alternative Fund Organization

With the challenging investment environment, some funds have chosen to organize themselves as corporate entities that investors can acquire stakes in[48]. There are several advantages to this new strategy.

Firstly, companies structured this way can be more flexible in their investment strategies. For example, International Real Returns (IRR), which invested in lower priced stocks when the Real devalued, was able to recover gains otherwise lost in the crisis. Secondly, the firm is able to raise additional capital by calling for a capital increase, rather than attempting to launch a full-fledged new fund[49]. Lastly, it allows for the possibility for the fund itself to go public, as CMGi did in the US[50].

5.4.4.1.7 Foreign Funds

Many foreign funds were also challenged by the lack of local knowledge and the distance involved in managing these funds form abroad. Some funds sought to change their management footprint and sought local expertise to mitigate this issue. The success of these funds from a country standpoint was also effected because these tended to be regional funds and not country focused. Conversely, local funds, which skirt around the distance and oversight issues by utilizing local experts and talent, often have problems raising capital from outside the country. However, these funds have seen considerable success in raising capital from global and international funds such as GP Investimentos and Netherlands, both of which raised funds from the US.

Brazilian funds share a commonality with US funds in that pension funds are the main source of capital. However, Brazilian law prohibited investments in private equity, which forced pension funds and investment managers to find creative ways to structure their investments. They had been structured as mutual funds; however, they were required to report daily valuations of the fund and restricted to investing in public companies. This changed when the Comissao de Valores Mobiliarios (CVM) revised this rule providing waivers to new funds, though those funds must now get approval from the CVM[51].

5.4.4.1.8 Industry Initiatives

In an attempt to strengthen Brazilian venture capital several initiatives were launched. Firstly, the Brazilian Venture capital Association, founded in 2000, was created to promote regulatory change and acts as a forum for open discussion on trends, changes and new industry requirements[52]. Next, SOMA, founded as an electronic exchange, its purpose was to bring over-the-counter trading to a transparent marketplace[53]. In addition, the Ministry of Science and technology (FINEP) launched a program called INOVAR[54]. INOVAR has created a fund of funds for venture capitalists[55]. Other funds have developed, Fundos Mutuos de Investimento em empresas emergentes (FMIEE)[56], though impeded by rules limiting investment to companies with US$30 million in revenue from the previous year[57]. There has been limited success with FMIEE, as of the close of 2001 only seven FMIEE funds have registered with CVM, with a limited amount of capital under management, between $20 and $30 million.

5.4.4.1.9 Recent Trends in Fund Investment

Funds as a whole have begun to shift towards more defensive technologies that are based on regional comparative advantage. The high failure rate of technology companies in Latin America is due partially to the low level of technology penetration. The low level of penetration represents an opportunity for private equity, as these areas will be precursors to Internet based development. Given the connection to international business channels, Latin American businesses stand to benefit from B2B product development in logistics, payment systems and fulfillment. This connection gives Latin American businesses a higher level of technology infrastructure; consequently B2B firms will see a sustained growth over the next five years[58]. As large multi-national firms take procurement online, SME's will be required to follow suite to remain part of the supply chain. By shifting away from "copycat" US models, Latin America companies are beginning to develop models that will relate more directly to the needs and issues faced by firms within their respective regions. With the majority of funds initially focusing on buyouts, there was little expertise developed for evaluation and management of early and seed stage funding. Funds are now looking to develop this expertise and general partners are moving up the learning curve[59].

5.4.4.1.10 Role of the Government

The government is taking an active role in future development for Brazilian venture capital. As of 2001, three funds were started; each focused on a different region, and intended to provide small infusions of capital and to facilitate future funding. BNDSPar, SEBRAE, PETROS, ANPROTEC, SOFTEX and the Inter-America Development Bank joined forces to develop these funds. Three funds will manage no more than US$20 million and each deal will be funded with no more than $160 thousand; the end objective is to enable venture capital and Brazilian pension funds to invest in them[60]. The largest pension fund in Brazil, PERVI, has currently allocated over US$140 million to alternative investments in 2005/2006.

Some of the Project Inovar actions have been:

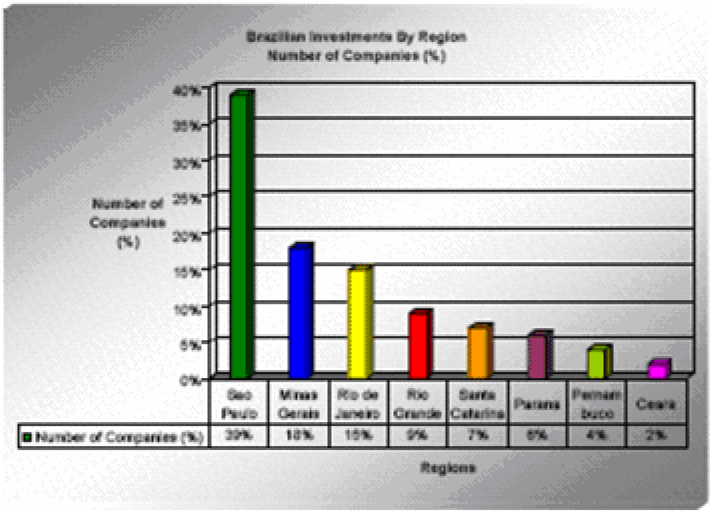
- Raised a US$216 million fund
- Encourage investment by pension funds in venture funds

- Seeded the Brazil venture fund with US$16 million
- Sponsored the Brazilian venture Capital Association

Lastly, the government has implemented changes that, though intended to protect investors in publicly traded companies, will extend to investors in private equity as well. The new bill entitles minority investors to the same benefits as controlling shareholders in a case of takeover; and it will also strengthen the CVM[61]. Additionally, the government overhauled the bankruptcy code, allowing arbitration for a contract to take precedence over a court decision[62].

Within Brazil, Sao Paulo receives the lion's share of private equity. Santa Catarina saw four companies funded in 2003, leaving it with 7% of the venture funding, (Figure 5-34).

Figure 5-34 Survey of Brazil, Associacao Brasileria de Capital De Risco.



Source ABCR/Human Venture Economics

5.4.4.1.10 Brazil/US Venture Capital Comparison

Table 5-7 Comparing Venture Capital between Brazil and the USA

	US	Brazil
Context	▪ Industry development since early 1980's ▪ Stable economy ▪ Strong growth coming from technology related sectors, generating opportunities for venture capital ▪ Disciplined companies	▪ Industry development after 1995 with emphasis in private equity ▪ Unstable economy ▪ Opportunities in restructuring and consolidating several industries ▪ Strong informality in the industries that need restructuring
Investment Companies	▪ Mainly angle investors, local investment funds, financial holdings and institutional investors	▪ Mainly foreign institutional investors and financial holdings ▪ Small presence of local pension funds ▪ Local are new and in the process of acquiring expertise
Pension Funds	▪ Investments in private transactions allowed since the early 1980's	▪ Strong investors in privatizations ▪ No private equity culture ▪ Can only invest in mutual funds. Allowed in 1997, but limited to 5%
Fund Managers	▪ High level of experience ▪ Always local structures	▪ Very few experienced firms ▪ Different degrees of "nationalization" of the administration structure as a way to differentiate among funds
Companies	▪ Highly professional firms ▪ Firms with open capital are commonplace	▪ Mostly SME with many family owned business ▪ Few firms with open capital ▪ State-owned firms going through privatization

	▪ Well prepared entrepreneurs	process ▪ Personal issues weigh heavily in business decisions ▪ Strong resistance to release control ▪ Not used to give decision rights to financial partners
Financial Markets	▪ Financial alternatives for different terms, firm size and risk levels	▪ Difficulty in obtaining funds even for larger firms ▪ Resources are available depending on Brazil's economic outlook ▪ If they exist they are expensive, then it is difficult to leverag4e the investments
Stock market	▪ Highly developed	▪ Poorly developed ▪ Transactions concentrated in a few large firms ▪ Low IPO prospects for SME's in the future
Exits	▪ IPOs ▪ Stratgic sale	▪ IPO is almost non-existent ▪ Exit strategy is the alternative, but it is not vast

Source: The Venture Capital and Private Equity Industry in Brazil

5.4.4.2 Conclusions

The weakness that the region and Brazil in particular, face, leave ample room for positive results. The venture capital industry is in a stage of relative infancy and can be directed towards region and country specific needs. Brazil needs to focus on alleviating weakness in financial disclosure, taxation and labor issues and the lack of an exit strategy. Minimizing or eliminating these weaknesses will ease the access to venture capital for seed and early stage companies. Local fund management will become increasing more important as foreign investors seek returns no longer available in the traditional venture environments.

5.5 Summary

In this chapter, we reviewed the literature on how technology parks and firms in technology parks are financed. We examined the many sources of financing for technology park tenants, in particular: angel financing, private venture capital financing, private equity financing, commercial bank loans, traditional equity finance, government-backed loans, direct government loans, government R & D grants and self-funding among others. We discussed that while most of these sources have a role in the financing of that each source of financing is "stage" specific to the firm and that the financing that is appropriate for a new firm will be different from that the financing for a firm in its growth phase. We described how venture capital is an especially appropriate source of financing for technology and innovative companies because of their unique nature. We presented data from a study done in the United Kingdom which shows that firms located on technology parks tend to use venture and public funding more than firms off-park. The study also indicated that this trend is true when firms are new and during their life and that both on-park and off-park firms indicated that access to finance is a restrictor of growth.

We then discussed the drivers for investing in firms in technology parks and noted that while venture capital is not the only source of financing for park firms, it is the form of financing that is particularly important to technology park firms as indicated by the AURP and IASP surveys. Venture capitalists are profit seeking entities and have specific criteria for investments. The major focus for a venture capitalist is the rate of return that their investment earns, which must be high given the risk that they assume. Venture capitalists tend to focus on specific industries which demonstrate the potential for rapid growth to help ensure that the firms they investment in will grow quickly and produce dramatic returns. Venture capitalists are unique, along with angel investors, as investors who take an active interest in the business operations of the firms they invest in. Much of the added-value that venture capitals bring to the technology industry is their ability to work with firms as directors to monitor, consultants to assist in the recruitment of management and provide other support services. Banks and other traditional investors rarely, if ever will take on this role with the firms the fund. Venture capital requires a specific skill set that is not necessarily found in most other traditional financial sectors. This may offer some of the explanation of why some regions of the world have smaller and less developed venture capital industries.

Venture Capitalists usually tend to focus on later stage, older and larger firms which are less risky. The exception to this trend is during sustained industry booms cycles as happened during the internet and dotcom booms in 1998-2001. Because of this fact, angel investors, made up of informal networks of investors who target newer companies and invest smaller amounts of money ($50,000 to $100,000) are critical for early stage firms and act as a bridge to venture capitalists. Corporations also are involved in venture capital and do invest in early stage companies. However, unlike traditional venture capitalist, they tend to invest for the strategic purpose of gaining access to technology or industry insight and not financial gain. For venture capital to work well, their must be a continual flow of new firms that meet venture capital investment criteria, and as important, there must be a viable path for the venture capital to exist the investment. Exits are usually done through merger and acquisition (M & A) or initial public offering (IPO) which requires secondary stock markets. When the link in the investment continuum is broken, the venture capital industry is not as robust or active.

The relative size and robustness of venture capital industries around the world is dependent on government policy which is an important driver of venture capital. Government policy can impact the source of funding for the industry as it did when the United States changed the ERISA law allowing pensions funds to invest in venture capital. The government can also “prime the pump” and launch an industry where it did not previously exist as was done in the United States by the SBIC program, and more recently in Israel and Korea. Tax policies are also an important driver for venture capital and can help create a favorable environment. Governments must be careful not to over do their support of the industry: there is evidence that too much intervention “crowds out” private sector participation and creates an inefficient industry totally dependent on government support.

After discussing the main drivers for the venture capital industry, we discussed the world wide trends in the industry. First we noted that venture capital is a cyclical business and has been subject to dramatic fluctuations, however, despite the dotcom bust, venture firms continued to increase their size and share in the economy. Starting with North America, the United States has the largest and most successful venture capital industry in the world. It is estimated that the industry has backed companies who now employ almost 10% of the total workforce and that venture capital backed companies outperform companies who obtain financing from traditional sources. Data also shows that venture capital financiers are efficient movers of capital and help create new, fast growing industries. Venture capital backed firms outpaced the national economy overall and posted substantial wage increases in the last three years. In the United States, a significant portion of venture capital is invested in support of product development and initial marketing; seed and start-up funding constituted $21.4 billion out of the total $340 billion, representing

6.3 percent. Merger and acquisitions (M&A) has gone through a boom and bust cycle in the last seven years as has venture backed initial public offerings (IPO). Venture capital supports U.S. global competitiveness and has allowed the country to improve its income and standard of living over most other advanced economies. The global trend in venture capital shows heavy investment in high-technology. Israel, as a percent of GDP, leads the world in venture capital investment in high technology, followed closely by the United States and Canada. Korea, one of the least developed countries in the OECD, has an exceptional venture capital industry when measured as a percentage of GDP.

Total investment in venture capital companies in the United States peaked in 2000 and has since leveled off over the last few years. The year 2004 marked the first increase in venture capital funding since the dot com bust. The life science sector has inched up to a five-year high in 2005 at $6.0 billion and 608 deals. Software and networking industries have slipped over the last two years, but the telecommunications wireless industry has become a hot spot. Silicon Valley continues to attract the most venture capital of any industry in the United States followed by the New England region. For the full-year 2005, later stage funding rose 22% to $9.7 billion dollars in 952 deals. Later stage accounted for 45% of all venture capital dollars. The continuing shift toward later stage investing over the past five years reflects venture capitalist ongoing support of existing portfolio companies via additional follow-on rounds. Private equity funds continued to outperform the public markets across all time horizons in the third quarter of 2005. Long term performance in both venture capital and buyouts remained steadfast, enjoying 20 year returns of 16.5% and 13.3% respectively. Business angel investing has grown considerably in the United States over the last five years from an estimated 50 formal networks to over 170. Angel investor groups are able to offer members a number of benefits including information sharing and access to quality deals.

The venture capital industry in Asia is quite different from that of North America; however, it is growing quickly as Asian economies are setting the pace for global expansion. The Asian private equity pool continued its rapid growth, surpassing $112 billion in total funds under management by mid-year 2005. Unlike the United States, where pension funds are the main source for venture capital, Asian venture capital funds obtain their capital from corporations (34%) and banks (19%) with pension funds making up 17% of funding. Japan is the number one country for funds under management closely followed by Hong Kong and Singapore training in a distant third ($29.7 billion, $27.5 billion and $11.5 billion respectively). In terns of investment, Japan also leads at over $13 billion with China closing in at $8 billion. Most of the venture capital funding in Asia focuses on buy-outs ($16 billion) with expansion/ growth capital following a distant second ($8 billion). Traditional industries such as financial services and transportation account for 60% of the funding and the high-tech industry receives only about 20%. Bank financing is not a popular means of acquiring capital in Asia especially for small businesses in developing countries. SME's difficulty in borrowing funds increases as the firm's number of employee's decreases. This is due to banks having greater difficulty judging the quality of the borrower. There are some interesting trends in venture capital in Asia. While Japan leads in venture capital, when measured as a percent of GDP, the amount of venture capital that goes into high technology does not compare with Korea. In Australia, fundraising has shown signs of slowing, and there is a sign that investment is moving from buy-out and expansion funds to turnaround funds. The private equity industry in China is focused on information technology. Beijing received the most funding, followed by Shanghai. It is predicted that foreign venture capitalists will become more active in China in the future. The Korean government has been very successful at stimulating the venture capital industry to invest in technology firms. The government accounted for about half of total shares in registered "Venture Capital Funds" and the chaebol (large industrial conglomerates) provided another 40%. India continues to see an increase in total private equity capital invested. The industry focus has been India's export oriented IT sector and outsourcing sector, but investors are expanding into financial sectors. Hsinchu Science Park in Taiwan is considered one of the great success stories of government intervention to develop a high-tech industry cluster. The government encourages venture capital funding and R & D funding through special programs.

Similar to the United States, Europe has a well developed financial services industry. Banks are the major providers of funding to small and medium size businesses. Venture capital only represents about 2% of all funds. The European venture capital industry is well developed but varies by country. The European venture capital industry has been relatively stable over the last five years and did not see the dramatic boom and bust that was seen in the United States. In 2004, European private equity investment totaled nearly $38 billion. However, there are dramatic differences between the different countries in the European Union reflecting distinct political and economic conditions. The United Kingdom has the largest private equity market in Europe. European private equity has a much greater focus on buy-out that in the United States. Europeans tend to target traditional mainstream industries, unlike the United States which targets technology industries. In Europe, banks are the largest contributor of funds to private equity making up 22% of total funds with pensions coming in second with 19% of funds. Like the United States, corporate venture capital plays a significant role in the European market, in absolute terms, it is quite small (2 billion Euro vs. 35 billion). However, corporate venture capitalists tend to focus more on start-up and expansion phase investments.

The Latin American Venture Capital industry is dominated by Mexico and Brazil.

The next chapter provides insight into the key factors that are essential for the success of a technology park. Data that was collected from surveys of park management and tenants was used to create a regression analysis that allowed us to identify 12 factors that we believe are essential to the success of any technology park. In addition to identifying these key success factors, we have also identified key failure factors which are factors that are likely to discourage firms from locating in parks. We also have identified the choice criteria firms use to locate in a park.

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Chapter 6

6.0 Choice Criteria for Location in a Technology Park

Choice Criteria for Location in a Technology Park and the Key Success Factors.

6.1 Introduction

One of the primary objectives of this research study is to identify the Key Success Factors (KSFs) for technology parks. The identification of these key factors will provide Sapiens Park management with clear guidelines to identify what they need to do (in terms of park development, management and marketing) in order to achieve management's objective of becoming the leading technology and innovation park in Latin America and gaining world-wide recognition for Florianopolis, Santa Catarina and Brazil.

This chapter is devoted to achieving this research objective of identifying the KSFs for technology parks based on the global surveys of technology park managers and park tenants that were conducted by the GLOBUSTRAT consulting team. This primary research is in turn reconciled with the findings of our literature review and other secondary research. The primary guiding framework for identifying the KSFs was the theoretical model presented in Chapter 3. Based upon this model, we collected relevant data from the survey of both managers and tenants, of technology parks worldwide, on the relative success of their parks and a variety of other factors that may be responsible for their success or lack of success. By analyzing the data obtained from the surveys, the research team identified a number of factors that were empirically shown to be keys to the success of parks. In the following sections, we present the process we followed to identify the key KSFs and the results derived from the statistical analysis of data. In addition to the identification of the KSF's, we also identified the factors that are important in attracting companies to a technology park. We also identified the factors that caused parks to fail. The identification of the important choice criteria used by companies to locate in a park is based on the survey of tenant companies in technology parks in our global sample.

6.2 Firms' Choice Criteria for locating in a Technology Park

In order to identify the important choice criteria of firms for locating in a technology park, one of the questions we asked, in the survey of tenants, was as follows:

> *"Please review the list of factors below and check (5) factors you believe are the most important selection criteria for locating in a technology park similar to the park you are currently in."*

Based on the literature review, we provided them a list of 17 factors plus an "other" category to specify their own factor. The responses provided by the tenants we surveyed are presented in Figure 6-1.

Figure 6-1 Choice Criteria of Firms for Locating in a Technology Park

Choice Criteria to Locate in a Park	**Number of respondents**	**Percentage of respondents**
Location of park	41	80%
Industry focus	25	49%
Company's goals	22	43%
Quality of park management	21	41%
Incentive package	15	29%
Government support	14	28%
Services offered	14	28%
Quality/nature of tenants	14	28%
Nature of customer service	11	22%
Funding availability	11	22%
Comparative investment cost	11	22%
Clear/simple policies and procedures	9	18%
Lack of bureaucracy	8	16%
One stop shop model	8	16%
Public/private partnership	5	10%
Market considerations	5	10%
Trade industry certification	1	2%

Source: TEMBA Survey of Tenants of Technology Parks Worldwide, 2006

This figure presents the list of 17 factors, in descending order of their importance, in which importance is determined based on the frequency of respondents selecting each of the 17 factors. The figure clearly shows that the number one factor identified by a great majority of the respondents (80%) is the location of the park. The review of the relevant literature conducted by the team on attraction factors clearly show that location is one of the key factors that determines the ability of a park to attract investors and tenants. The location of the park is followed by the industry focus of the park, which is identified by about half of the respondents surveyed (49%) as a key choice criterion. This is not surprising given that a firm considering location in a park definitely needs to think whether or not a given park is compatible with the industry the firm is in. This criterion was closely followed by a related variable, which is a company's (strategic) goal. Similar to the industry focus, the technology park also needs to be compatible with the goals of the potential tenant.

The quality of park management was identified as another important factor by a sizable number of respondents (41%). The other factors that were identified by about one-forth of the respondents were the incentive package offered, government support, services offered and quality/nature of other tenants. Collectively, identification of these factors as choice criteria by a sizable number of respondents surveyed indicates that companies consider a variety of factors which are not necessarily associated with the technology park itself. Although a majority of factors chosen are associated with some aspects of the park itself, some of the other factors have to do with the companies, themselves, other tenants and the government.

It is also important to note that factors such as trade industry certification, market considerations and public/private partnership received very few responses. It is quite possible that some of the factors which did not receive high responses from the respondents as "choice criteria" may turn out to be important factors for the purpose of the "success" of parks. We present the analysis of KSFs next.

6.3 Measurement Model to Identify KSFs

In order to identify the factors that are keys to the success of a park, we started out with the 12 factors we had presented in our GLOINTECH model. As mentioned earlier, these twelve factors were identified based on an extensive review of the literature including the work of Michael Porter, who is the leading authority on this subject and who has proposed a highly used model of cluster formation that is used in the explication of technology park formation. Those 12 factors are re-produced in Figure 6-2.

Figure 6-2 Twelve Factors in the GLOINTECH Model

1. Firms' strategy, structure & rivalry
2. Factor conditions
3. Demand conditions
4. Related and supporting industry
5. Business climate
6. Industry networks
7. Public policy
8. Concentration of firms
9. Innovation & Entrepreneurship
10. Historical factors
11. Element of chance
12. Anchor effect

In order to identify the relative role of these 12 factors in influencing the success of parks, we used the following measurement model.

Relative Success of a Park = f (Relative Presence of 12 Factors Identified in the GLOINTECH Model)

In this measurement model, the dependent variable is the relative success of the park. The independent variables are the relative presence or absence of each of these 12 factors, from the model. The purpose is to examine which one of these 12 factors' relative presence, in the parks surveyed, are responsible for the relative success of the parks.

6.4 Measurement of Dependent and Independent Variables

In this section, we present details regarding how we measured the independent and dependent variables. Question # 5 in the survey of management asked:

> *"What is your opinion about the relative success of this park?"*

The responses choices were a) very successful; b) somewhat successful; c) less successful; and d) not successful at all. Allowance was also made for no response. The results from the survey related to this question are presented in Figure 6-3.

Figure 6-3 Relative Success of the Parks Surveyed

Categories	Frequency	Percentage	Valid Percentage	Cumulative Percentage
4. Very successful	55	44.7%	47.8%	47.8%
3.Somewhat successful	53	43.1%	46.1%	93.9%
2. Less successful	6	4.9%	5.2%	99.1%
1. Not successful at all	1	0.8%	0.9%	100%
No response	8	6.5%	100%	
Total	123	100%		

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

The figure shows that altogether 123 managers participated in the survey although only 115 (93.5%) of the survey respondents provided an answer to this question. Almost one-half (47.8%) of the respondents believed their park to be "very successful" whereas another 43.1% of the respondents believed to their parks to be "somewhat successful." Only 5.7% of the respondents believed that their parks were either "less successful" or "not successful at all." It is quite possible that there may be some bias on the part of the manager-respondents to regard their parks to be "successful." At the same time, as the results show, their responses are not clustered towards the "very successful" category only.

In order to measure the 12 factors or independent variables, we actually operationalized them as a set of 15 variables to make sure that the respondents understood the meaning of those factors. For each of the 15 variables, we asked the respondents the following in question #4:

> *"Please rate the degree of presence of the following factors in relation to your technology park."*

Details were provided regarding each of these 15 variables in another section of the survey. The respondents were asked to rate the 15 variables by using a 4-point scale as follows: 1 = Not present at all; 2 = Less than desired level of presence; 3 = Present at adequate level; and 4 = Present at ideal level. The 12 factors from our theoretical model and 15 variables designed to measure these corresponding factors are presented in the following Figure 6-4.

Figure 6-4 12 Factors from the Theoretical Model and 15 Variables Used to Measure Them

Constructs from the Model	Variables in the Survey
1. Firms' strategy, structure & rivalry	5.Regional presence of competitors & collaborators
2. Factor conditions	1. Availability of labor 2. Availability of capital 3. Availability of infrastructure
3. Demand conditions	4. Presence of market demand
4. Related and supporting industry	6. Presence of supplier and related industries
5. Business climate	7. Favorable business climate 8. Favorable socio-political climate
6. Industry networks	9. Existence of inter-firm linkages/connections
7. Public policy	11. Favorable government policy
8. Concentration of firms	10. High concentration of firms
9. Innovation & Entrepreneurship	13. Presence of local innovation & entrepreneurship
10. Historical factors	15. Presence of historical factors
11. Elements of chance	12. Elements of chance
12. Anchor effect	14. Existence of leading & anchor firms

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

As this figure shows, we used only one variable per factor for most of the factors. However, for a few factors, we felt it was necessary for us to use multiple variables in order to provide clarity to the respondents regarding the meaning of certain factors.

The survey respondents' responses are presented in the following Figure 6-5.

Figure 6-5 Frequency Distribution of Responses to 15 Variables

Variables in the Survey	**Average**	**Present at an ideal level**	**Present at an adequate level**	**Present at a less than desired level**	**Not present at all**
		4	**3**	**2**	**1**
7. Favorable business climate	3.13	33%	49%	17%	2%
1. Availability of labor	3.04	21%	62%	16%	1%
3. Availability of infrastructure	3.10	32%	50%	15%	4%
8. Favorable socio-political climate	3.01	22%	60%	16%	3%
11. Favorable government policy	2.89	22%	49%	25%	4%
13. Presence of local innovation & entrepreneurship	2.89	27%	37%	33%	3%
4. Presence of market demand	2.86	17%	54%	29%	1%
6. Presence of supplier and related industries	2.81	14%	54%	31%	1%
9. Existence of inter-firm linkages/connections	2.80	20%	42%	38%	1%
14. Existence of leading & anchor firms	2.79	25%	35%	34%	6%
5. Regional presence of competitors & collaborators	2.74	10%	58%	29%	4%
12. Elements of chance	2.64	8%	54%	33%	6%
2. Availability of capital	2.63	13%	43%	38%	6%
10. High concentration of firms	2.61	14%	40%	40%	6%
15. Presence of historical factors	2.56	18%	35%	34%	14%

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

The last four columns of this figure present the percentage of respondents who fall into each of the four categories. For example, 33% of the managers who responded to this question believed that their parks had an "ideal" level of favorable business climate whereas 49% of the responding managers believed that their parks had only an "adequate" level of favorable business climate. The remaining 17% thought they had less than the desired level of favorable business climate and 2% believed that a favorable business climate was "not present at all" in their parks.

The second column presents the average score of respondents across four categories by using a 4-point scale. Actually this figure presents the 15 variables sorted by their means in descending order. A comparison of means across 15 variables indicates the relative presence of these 15 variables. For example, a mean of 3.13 for "Favorable business climate" means that on average, this variable is present at slightly above "desired level" whereas a mean score of 2.56 at the bottom for "presence of historical factors" means that historical factors are present somewhere between "desired" to "adequate" levels.

6.5 Factor Analysis to Reduce Variables into Fewer Dimensions (Factors)

We tested the OLS regression model using the relative success of parks, as the dependent variable, and the 15 variables, presented above, as the independent variables. Results indicate that the regression model was not significant at acceptable level of p-value of 0.05. Upon diagnosis of results, we realized that the model is not significant due to the multicollinearity problem associated with the correlation of independent variables. When multicollinearity exists, the regression procedure does not estimate the significance of the coefficients of the model correctly. This is caused by the inability to separate the independent variation of the independent variables due to their high correlation. One way to address this issue was to reduce the 15 variables into fewer dimensions or "factors" based on their underlying empirical relationship.

This task of reduction of variables into the so called factors is achieved through the statistical procedure called Factor Analysis. The Factor Analysis of these 15 variables produced the results presented in Figure 6-6.

Figure 6-6 shows that there are four factors that represent the data contained in the 15 variables. These factors or dimensions represent the information contained in the original 15 variables. Each factor represents a set of variables. The factors and their corresponding variables are identified by different colors in Figure 6-6. For example, the first four variables presented in the first column represent the first factor. The values or loadings under each factor for each variable indicate the correlation of each variable with each factor. The sizes of these correlations indicate which variables go with which factor.

Figure 6-6 Factors and the Loadings of 15 Variables on Those Four Factors

Variables	Factor1	Factor2	Factor3	Factor4
Favorable Socio-Political Climate	0.811	0.170	0.106	0.038
Favorable Government or Public Policy	0.755	0.125	0.065	0.146
Favorable Business Climate	0.637	0.028	0.292	0.481
Availability of Labor	0.563	0.064	0.286	0.152
Presence of Historical Factors	0.203	0.802	0.077	0.307
Existence of Inter-firm Linkages/Connections	0.436	0.680	0.018	0.108
High Concentration of Firms	0.314	0.543	0.377	0.205
Element of Chance	0.079	0.508	0.294	0.319
Presence of Local Innovation and Entrepreneurship	0.300	0.507	0.383	0.155
Regional presence of Competitors/Collaborators	0.057	0.103	0.851	0.069
Presence of Suppliers and Related Industries	0.043	0.167	0.688	0.350
Presence of Market Demand	0.312	0.314	0.539	0.108
Availability of Capital	0.096	0.087	0.202	0.767
Availability of infrastructure	0.229	0.133	0.080	0.687
Existence of Leading/Anchor firms	0.251	0.451	0.240	0.543

Based on these loadings, the first factor seems to represent the favorable business environment. The only variable that is odd here is the availability of labor which also loads with factor 3 and to some extent with factor 4. Given this result, we will name this factor 1 as the "Business Environment and Labor" factor and its managerial interpretation is that this factor represents variables that are primarily related to the business and socio-political environment that is inclusive of government policy and the availability of labor.

The second factor has five variables with the highest loadings. These variables seem to relate to the endowment of the geographical area where a park is located. Variables like historical factors or "path dependency" (as economists call it), existence of inter-firm linkages and connections, the high concentrations of firms in a region, and the presence of local innovation and entrepreneurship are all variables that are location specific and represent geographical endowments. Even the variable "element of chance" refers to location specific endowments such as the reputation of a leading location, the geographical location of the park, the origin of the firm's founders in the region and the element of pure chance that favors a location. The inclusion of the "element of chance" happens to be correlated with

Factor 3 and Factor 4 but nevertheless provides a plausible grouping of location specific factors. Given this pattern of loadings, this factor can be referred to as the "Park–specific Endowment" factor.

The third factor has three variables with the highest loadings. These three variables relate to both supply and demand. They represent three out of Michael Porter's four diamond factors - Presence of Competitors and Collaborators (Porter's "Firm Strategy, Structure and Rivalry"), Presence of Related and Supporting Industries (Porter's "Related and Supporting Industries") and the Presence of Market Demand (Porter's "Demand Conditions"). Therefore, this factor can be said to be the "Co-opetition and Demand" factor and is representative of the majority of Porter's diamond variables.

Finally, Factor 4 has three variables correlated with it. The first two variables relate to the availability of capital and infrastructure, which are part of Porter's "Factor Conditions" diamond. Both of these variables reflect the availability or supply of inputs or "factors of production" to support technology park success. The last variable, "existence of leading/anchor firms" is also correlated with Factor 2 and can be considered a factor supply condition. In general, these variables relate to supporting elements. As such, it can be called the "Input Prerequisites" variable.

Next, we present the revised measurement model and the results from the empirical test of this model.

6.6 Revised Measurement Model of KSFs:

Having identified four major factors or dimensions representing the 15 variables, the revised measurement model is as follows:

Relative Success of a Park = f (Relative Presence of 4 Factors)

In this model, the relative success of a park is influenced by the relative presence of the 4 factors that we identified in the previous section rather than using the original 15 independent variables.

6.7 Identification of KSFs Using Regression Analysis

In this section, we present the results of the regression analysis using the relative success of the parks as the dependent variable and four dimensions or factors derived from the Factor analysis as the independent variables. Figure 6-7 presents the statistics regarding the overall significance of the model. The F-statistics of 5.328 is significant at p <.001. It means that there is at least one factor out of 4 factors that makes a significant impact on the relative success of parks.

Figure 6-7 Significance of the Overall Measurement Model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.396	4	1.849	5.328	.001[a]
	Residual	32.624	94	.347		
	Total	40.020	98			

a. Predictors: (Constant), Pre-requisites, Supply and Demand, Park Specific Endowment, Business Environment & Labor

b. Dependent Variable: Relative Success of the Park

In Figure 6.2, we presented the data regarding the relative success of 117 parks that are located in 29 countries. That figure clearly showed that not all the parks were believed to be very successful (48%). As a matter of fact some parks were believed to be somewhat successful (46%) whereas others were believed to be less successful (6%). Given that the overall model is significant, we further examine how well the model is able to explain this difference in the level of success of the parks surveyed. The explanatory power of the model is examined by using the R-square statistic presented in Figure 6-8.

Figure 6-8 Explanatory Power of the Measurement Model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.430[a]	.185	.150	.589

a. Predictors: (Constant), Pre-requisites, Supply and Demand, Park Specific Endowment, Business Environment & Labor

This figure shows that the R-square is equal to 18.5% which means that these four factors included in the measurement model are able to explain about 19% of the differences in the relative success of parks. Although this 19% is not very a high percentage in terms of the model's ability to explain the differences or identifying the key factors, it simply means that there are other variables that have influence on the relative success of the parks. Next we examine which of these four factors can be regarded as KSF's and their relative importance in explaining the relative success of the parks. The results are presented in Figure 6-9.

Figure 6-9 Significance and Relative Importance of Factors

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.414	.059		57.663	.000
	Business Environment & Labor	.150	.060	.235	2.522	.013
	Park Specific Endowment	.137	.060	.214	2.297	.024
	Supply and Demand	.115	.060	.180	1.928	.057
	Pre-requisites	.145	.060	.227	2.441	.017

a. Dependent Variable: Relative Success of the Park

This figure shows that except for Factor 3 (Supply and Demand), all the remaining three factors are significant at a p-value of 0.05 or less. Although the third factor, i.e. Demand and Supply is not significant at $p<.05$, it is significant at $p <.06$. In other words, this factor is marginally significant. It can also be seen that all four factors have a positive sign indicating that the relative presence of these factors results in the relative success of the park. Given these results, we include all the four factors as important factors in explaining the relative success of the parks.

Based on the standardized betas presented in column four of Figure 6-8, we present the relative importance of these four factors and the original 15 variables they represent in order to get a better sense of the KSF's. The results are presented in Figure 6-10.

Figure 6-10 Ranking of 15 Factors Based on Regression Results

Factors and Their Associated Variables	**Relative Importance**
Factor 1: Business Environment & Labor	**27.5%**
1. Favorable Socio-Political Climate	
2. Favorable Government or Public Policy	
3. Favorable Business Climate	
4. Availability of Labor	
Factor 4: Input Prerequisites	**26.5%**
5. Availability of Capital	
6. Availability of infrastructure	
7. Existence of Leading/Anchor firms	
Factor 2: Park-specific Endowment	**25.0%**
8. Presence of Historical Factors	
9. Existence of Inter-firm Linkages/Connections	
10. High Concentration of Firms	
11. Element of Chance	
12. Presence of Local Innovation and Entrepreneurship	
Factor 3: Co-opetition & Demand	**21%**
13. Regional presence of Competitors/Collaborators	
14. Presence of Suppliers and Related Industries	
15. Presence of market demand	

According to the data presented in this figure, the most important factor is Factor 1, i.e. the variables representing Business Environment & Labor. If we use 100% as the total explanatory power of these four factors, then 27.5% of the explanatory power is captured by this factor. It is made up of four variables. This result suggests that the most important success factors are favorable socio-political climate, favorable government or public policy, favorable business climate and availability of labor. In case of all the four variables, the government has direct or indirect role including the availability of labor through public institutions designed to educate and train labor. This importance of this factor essentially suggests the important role the government can play in the success of a park but from the point of view of creating a favorable business climate, maintaining socio-economic stability, creating a supply of skilled and semi-skilled labor through a system of training and education and providing the right mix of business-friendly government policies.

The next important factor is Factor 4 (Input Prerequisites) which represents 26.5% of the explanatory power of the model. This factor represents three major variables: the availability of capital, the availability of infrastructure and the existence of leading/anchor firms. These variables suggest the need for sources of finance and a well developed infrastructure as well as the need for the presence of leading or anchor firms for the relative success of technology parks.

The third important factor is Factor 2 (Park-specific endowment) which represents 25% of the explanatory of the model. This factor is composed of 5 variables. The two variables, namely the presence of historical factors and presence of local innovation and entrepreneurship have to do with the endowment of the geographical area where the park happens to be located. Similarly, as discussed above, the high concentration of firms and the existence of inter-firm linkages and connections could be also due to factor endowments of the park or the outcome of the build-up of such endowments over time. Finally, element of chance has also to do with geographical location of the park as well as a pure chance factor.

The final factor is Factor 3 (Co-opetition and Market Demand) which is marginally significant. Its explanatory power is equal to 21%. It is composed of three variables: regional presence of competitors/collaborators, presence of suppliers and related industries and presence of market demand. It essentially indicates that compared to other variables, the presence of suppliers, complementors and buyers in the park is of less importance than the importance of other variables represented by the three other factors.

6.8 Relative Importance of Individual Elements of KSFs

In addition to identifying the impact of the relative presence of the 15 variables on technology park success, we also provided a list of variables or indicators within each of these 15 variables to the survey respondents and asked them the following in question #Q8:

> *"Please rate the importance of the following elements of each of the factors below in the success of technology parks in general."*

Altogether we asked the respondents to rate a total of 73 sub-variables, representing the 15 variables, using a four-point scale (1=not important at all; 2=less important; 3=somewhat important; and 4=very important). The results of this part of the survey are presented in Figures 6.11 through 6.14 for each of the four factors in turn.

We present the means of each of the individual element, of each variable, under each factor. Given that we used a four-point scale, a mean of at least 3 indicates that the variable is somewhat important. Any mean higher than 3 means that the variable is approaching a high level of importance. Therefore, although we presented means for all the variables associated with each factor, we needed to pay particular attention to those elements or variables where the mean values are at least 3 or more.

Figure 6-11 Relative Importance of the Elements of Factor 1

Factor and Variables	**Indicators Measuring Variables**	**Mean**
Factor 1:	**Business Environment & Labor**	
Favorable Socio-Political Climate	Quality of life in the country	3.25
	Political stability	3.29
	Level of corruption in the country	3.18
	Widely used common language	3.17
	Amount of labor unrest in the country	2.99
	Crime rate of the country	2.90
Favorable Business Climate	Climate of business innovation	3.54
	Local support of enterprises/entrepreneurship	3.51
	Climate of risk taking	3.32
	Business & government collaboration	3.28
	Historic record of being business friendly	3.22
	Local results oriented business culture	3.20
	Enforcement of private property law	2.75
	Low risk of nationalization	2.59
Availability of Labor	Availability of skilled labor	3.65
	Proximity of colleges with graduate degrees	3.48
	Labor productivity	3.16
	Cost of labor	2.88
	Availability of literate unskilled labor	2.07
Favorable Government or Public Policy	Protection of private & intellectual property	3.59
	Presence of R&D policies and incentives	3.35
	Presence of tax laws & tax incentives	3.28
	Presence of financial incentives	3.20
	Presence of trade & investment policies	3.08
	Fiscal, trade and investment incentives	2.90
	Foreign exchange/capital movement restrictions	2.87
	Educational background of public policy makers	2.85
	Presence of incorporation/bankruptcy laws	2.81

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

In

Figure 6-11 shows the elements of Factor 1, the five variables that have the highest mean scores equal to greater than 3.5 are the availability of skilled labor (mean=3.65), protection of private & intellectual property (3.59), climate of business innovation (3.54), local support of enterprises/entrepreneurship (3.51) and proximity of colleges with graduate degrees (3.48). These high means scores almost approach 4.00 indicating that the management of the parks surveyed regard these variables to be among the set of the most important variables impacting the success of technology parks.

Figure 6-11 also shows the variables that were rated to be of less importance in the explaining the success of the parks. For example, variables such as the availability of literate unskilled labor (2.07) and low risk of nationalization (2.59) received the lowest mean scores, among the variables listed in this figure, indicating that these variables are less important in the success of the parks.

Figure 6-12 presents the means of 14 variables representing Factor 4 (Input Prerequisites). The means indicate the relative importance of these variables.

Figure 6-12 Relative Importance of the Elements of Factor 4

Factor and Variables	**Indicators Measuring Variables**	**Mean**
Factor 4	**Pre-requisites**	
Availability of Capital	Availability of venture capital	3.39
	Availability of government funding	3.08
	Availability of commercial financing	3.05
	Availability of traditional bank funding	2.92
	Availability of international funding	2.47
Availability of infrastructure	Availability of telecommunication services	3.69
	Availability of power supply	3.48
	Availability of land	3.38
	Availability of air/rail/sea/road	3.21
	Cost of telecommunication services	3.13
	Availability of healthcare services	2.75
	Presence of hospitality/tourism infrastructure	2.71
Existence of Leading/Anchor firms	Number of local industry leader firms in the region	3.04
	Number of international firms in park/region	2.80

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

Figure 6-12 shows that the highest mean scores are represented by two variables representing the availability of infrastructure. They are the availability of telecommunication services (3.69) and the availability of power supply (3.48). These two elements of infrastructure can be seen to be the prerequisites of success of technology parks. None of the variables representing the availability of capital received such a high mean score although the availability of venture capital received the highest mean score (3.39) among the elements of capital.

The variables that are regarded as of less importance are the availability of international funding (2.47), the presence of hospitality/tourism infrastructure (2.71), the availability of healthcare services (2.75) and the number of international firms in the park/region (2.80).

Figure 6-13 presents the mean scores of variables or indicators of Factor 2 (Park -specific Endowment). There are a total of 18 variables representing this factor. The four variables that have received the highest mean scores are the availability of technologists and managers (3.54), collaboration of firms and research institutions (3.42), the geographical location of the park (3.41) and reputation as a leading location (3.40). These variables essentially represent the geographic endowments of the location of the park, the affiliation with research universities or institutions and the availability of highly skilled personnel.

Obviously, the technology park managers we surveyed do not seem to believe in pure chance as a source of success given that it received the lowest mean score (2.23). The origins of firm's founders in region also received relatively low importance (2.69).

Figure 6-13 Relative Importance of the Elements of Factor 2

Factor and Variables	**Indicators Measuring Variables**	**Mean**
Factor 2:	**Park Specific Endowment**	
Presence of Historical Factors	Historical presence of key firms in region	2.84
	Past history of links of incoming firm and regional firms	2.82
Existence of Inter-firm Linkages/Connections	Collaboration of firms & research institutions	3.42
	High level of inter and intra-firm linkages	3.12
	Existence of industry associations	2.97
	Presence of cross border industry networks	2.91
	Sharing of labor/other resources between firms	2.77
High Concentration of Firms	Positive benefits of locating near other firms	3.25
	Spillover of knowledge between firms	3.11
	Large number of firms/suppliers in region	2.96
Element of Chance	Geographical location of park	3.41
	Reputation as a leading location	3.40
	Origins of firm's founders in region	2.69
	Pure chance	2.23
Presence of Local Innovation and Entrepreneurship	Availability of technologists & managers	3.54
	Presence of local entrepreneur started firms	3.28
	Patent and intellectual property activities in region	3.26
	Number of local business incubators	3.00

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

Finally, Figure 6-14 presents the mean scores of variables representing the last Factor 3, i.e. the Co-opetition and Demand Factor. A total of 13 variables contribute to this factor.

The four variables that received mean scores of at least 3 or more are: the growth rate of overall market (3.24), the proximity to complementary firms (3.23), the presence of partner/related firms (3.11) and the availability of logistics services (3.01). These indicate the importance of demand growth and the existence of complementor firms and services in successful technology parks.

It is quite clear that managers do not like to have the presence of competitors given that this variable received the lowest mean score (2.68) among the variables presented in this list. They also do not regard proximity to local buyers as being of high importance (2.69). Similarly, the availability of consulting firms in the park is of less importance (2.71).

Figure 6-14 Relative Importance of the Elements of Factor 3

Factor and Variables	**Indicators Measuring Variables**	**Mean**
Factor 3	**Co-opetition and Demand**	
Regional presence of Competitors/Collaborators	Proximity to complementary firms	3.23
	Presence of leading firms	2.98
	Presence of local competitors	2.68
Presence of Suppliers and Related Industries	Presence of partner/related firms	3.11
	Availability of logistics services	3.01
	Availability of local suppliers	2.98
	Availability of accounting & legal services	2.88
	Availability of financial & tax services	2.83
	Availability of consulting firms	2.71
Presence of market demand	Growth rate of overall market	3.24
	Size of local market	2.90
	Access to international buyers	2.88
	Proximity to local buyers	2.69

Source: TEMBA Survey of Management of Technology Parks Worldwide, 2006

6.9 Key Failure Factors Identified by Management and Tenants of Parks:

In order to identify the factors that might cause the failure of technology parks, we also asked both the managers of the parks (Q7) and the tenants of parks (Q6) a question relating to the identification of these failure factors:

> *"Please name the three (3) factors that you believe are likely to discourage companies and other organizations (e.g., research institutes and educational institutions) to locate in a technology park?"*

Thus in this question, our intent was to identify the factors that discourage companies from locating in a park on a self-reporting basis. In other words, in addition to identifying the key success factors for technology parks through a detailed statistical analysis of variables, we also wanted to seek the park managers' and tenants' opinions regarding the variables whose "absence" is likely to dissuade firms from locating in a given park. Through this means, we intended to identify so called "key failure factors." The results of this analysis are presented in Figure 6.15.

Figure 6-15 Key Failure Factors Identified by Management and Tenants of Technology Parks

Key Failure Factors	**Management**	**Tenants**
High cost of entry and operation:	48%	59%
Lack of Infrastructure & facilities	38%	66%
Improper location	30%	27%
Lack of skilled labor	19%	20%
Limited funding	13%	7%
Bureaucratic/regulation	22%	5%
Lack of affiliation with Research universities/institutions	20%	0%
Limited space	7%	12%

Source: TEMBA Survey of Management and Tenants of Technology Parks Worldwide, 2006

This figure shows that about one half (48%) of the respondents managers surveyed identified the high cost of entry and operation (fees, taxes, real estate rent, labor) in a technology park as a critical factor that is likely to discourage firms from locating in a park. Similarly, about one-third of the managers surveyed regarded the lack of infrastructure and facilities (including laundry services, medical facilities, public transportation systems among others) and improper location (30%) as factors that discourage firms from locating in technology parks. We call such factors key failure factors (KFFs). Our results show that the tenants are in great agreement regarding the importance of these three factors since the same three factors were identified as the critical factors by a majority of the tenants surveyed on a purely self-reporting basis. About two-thirds of the tenants regard the lack of infrastructure and facilities (66%) and the high cost of entry and operation (59%) as the KFFs. Similarly, about one-fourth of the tenants surveyed regard improper location (27%) as one of the major KFFs.

Besides, these three major factors identified by a significant percentage of two groups of respondents, there are other factors listed in this figure that are also likely to cause a park to be less attractive for locating in by prospective tenants. They are the lack of skilled labor, limited funding, a bureaucratic or overly regulatory environment, the lack of affiliation with research universities/institutions and limited space to expand. The relative importance of these factors varies for management and tenants as reflected in the percentages of managers and tenants who identified these factors. A rank correlation of the percentage distribution across these 8 factors for managers and tenants indicate that the correlation (=0.43) is not significant at $p <.05$. It means that managers and tenants do not agree regarding the ranking of these factors. However, these are the 8 major factors identified by these two groups to be KFFs or the factors that discourage firms from locating their business in a technology park.

In order to see whether there is any relationship between these KFFs and the ratings of individual variables, regarding their importance in the success of parks presented in Figure 6-10 through Figure 6-13, we have reproduced the mean scores of the variables which are associated with these eight KFF's in Figure 6-16.

Figure 6-16 shows that for each of the KFFs identified in Figure 6-15, there are a corresponding set of variables which received high mean scores reflecting the high importance of these variables in the success of parks. For almost all the variables associated with each of these 8 KFFs, the mean score is higher than 3.00 which means that these variables were identified as "somewhat important" or closer to "very important." It shows that these KFFs are really very important not only for the purpose of attracting the companies to locate in parks but they are also important for the success of parks in the sense that the removal of these factors is responsible for the success of parks.

Figure 6-16 KFFs and Relative Importance (Means) of Variables Associated with These Variables

Key Failure Factors	Management	Tenants
High cost of entry and operation: Presence of R&D policies and incentives (3.35) Presence of tax laws & tax incentives (3.20) Presence of financial incentives (3.20) Fiscal, trade & investment incentives (2.90) Cost of labor (2.88)	48%	59%
Infrastructure & facilities: Availability of telecommunications (3.69) Availability of power supply (3.48) Availability of land (3.38) Availability of means of transportation (3.21) Availability of logistics (3.01)	38%	66%
Improper location: Geographical location of parks (3.41) Reputation as a leading location (3.40)	30%	27%
Lack of skilled labor: Availability of skilled labor (3.65) Availability of technologists/managers (3.65)	19%	20%
Limited funding: Presence of financial incentives (3.20) Availability of venture capital (3.39)	13%	7%
Bureaucratic/regulation: Climate of business innovation (3.54) Climate of risk taking (3.32) Business and government collaboration (3.28) Historic record of being business friendly (3.22)	22%	5%
Lack of affiliation with research universities/institutions: Proximity of colleges with graduate degrees (3.48) Collaboration of firms and research institutions (3.42)	20%	0%
Limited space: Availability of land (3.38)	7%	12%

Source: TEMBA Survey of Management and Tenants of Technology Parks Worldwide, 2006

6.10 Summary

The primary objective of this chapter was to identify the key factors that are essential for the success of a technology park. We used the data collected from the surveys of park management and tenants to identify the KSFs. In our theoretical model presented in an earlier chapter, we had identified 12 factors that we believed were essential for the success of any technology park. Based on the regression analysis of relative success of parks on a set of 15 variables representing these 12 factors, we showed that all the 12 factors presented in our theoretical model are important KSFs although their relative importance varies. We showed that these variables can be categorized into four sets of factors which vary regarding their relative importance in success of parks. The factors that we found to be significant in explaining the success of parks in terms of their ranked relative importance were:

Factor 1: Business Environment and Labor

Factor 4: Input Prerequisites

Factor 2: Park-specific Endowment

Factor 3: Co-opetition and Demand

In addition to identifying KSFs, we have also identified so called key failure factors (KFFs) which are likely to discourage firms from locating in parks. We also showed that there is a great deal of similarity between the KSFs and KFFs indicating that there are certain factors which are necessary for both attracting firms to the parks and for their success in the parks. In addition to these KSFs, we also identified the choice criteria firms use to locate in a park. These choice criteria were identified based on the survey of tenants worldwide.

Chapter

7

7.0 Financing – Key Success Factors

Worldwide Practices and Key Success Factors for Financing Technology Parks.

7.1 Overview

This chapter provides details on the financing of technology parks in order to meet the research objective of providing Sapiens Parque management with an idea about how technology parks finance themselves and what are the best practices in this area. We also look at the key success factors with respect to park financing based on the results of our survey.

The chapter covers two distinct areas. The first section covers the types and modes of financing technology parks and provides a detailed discussion of the models that are used to finance parks. Examples of some successful financing models are provided in this first section with a detailed discussion of the advantages and disadvantages of the major modes as well as some best practices.

The second section provides the responses of the technology park manager respondents and park tenant respondents to the GLOBUSTRAT Worldwide Technology Park Survey. This section presents the perceived importance of the different modes of finance as seen by technology park managers and tenants. As such, it provides the best insight in to the key financing modes for technology park success as perceived by the technology park managers and park tenants we surveyed. It provides the best proxy assessment for key success factors in technology-park financing that could be ascertained given the difficulties of making a direct assessment. This section also provides detailed information on the prevalent modes of technology-park financing worldwide based on the responses to our two surveys. A summary and conclusion is them provided to close the chapter.

7.2 Technology Park Financing

The costs and methods of developing and financing technology parks vary from country to country. Nevertheless, the creation of a successful technology park by any standard is a costly endeavor. The costs of development are usually much greater once buildings are considered as part of the development. Although capital for infrastructure and property is the most visible component, there are other important cost factors to consider, for example, the management and operation of the technology park. These management functions involve:

- Securing resources for the development of the technology park;
- Promoting the technology park and identifying and securing the tenant companies;
- Providing the all important links between tenant companies and universities, research and development facilities and industrial enterprises;
- Assisting young and start-up high technology companies with business plans and problems as they arise;
- Management of the land and buildings on the estate;
- Operating and providing services in the estate;
- Planning the estate and its strategy and making investment decisions.

There are usually four types of technology parks in the world in terms of ownership and structure of operation, namely:

- Public or not-for-profit technology parks
- Private technology parks
- Academic institution-related technology parks
- Hybrid technology parks

Public or not-for-profit technology parks and incubators are usually sponsored by governments and not-for-profit organizations serve primarily the purpose of local economic development such as job creation, economic diversification and/or expansion of the tax base.[1] Private technology parks are initiated and developed by private investor groups, real estate development companies and large private companies for profit and are run with the objective of generating market returns to their shareholders or owners.

The major sources for funding of technology parks are the following:

- Grants and gifts
- Sponsorship
- In-kind support
- Soft loans
- Commercial loans
- Commercial leases
- Income for services provided
- Rental Income
- Revenue sharing with partners
- Shareholder funds with government support
- Equity participation with client companies
- Royalty Agreements

7.2.1 Strategies for Financing Technology Parks

One of the factors for the success of technology parks is the availability of financing. While, in the United States there is a diversity of technology park and incubator sponsorship, in the newly industrializing countries such as China, Taiwan and India, technology parks usually rely on strong government support.[2]

There are four main models that are usually used in the financing of technology parks. They will be described as models 1, 2, 3 and 4 with the following definitions[3]:

- **Model 1:** In this strategy, the state provides the initial investment and then lets the technology park meet all operating cost on a fee for service basis.
- **Model 2:** Both capital and operating costs are covered as a social investment (100% publicly owned and operated).
- **Model 3:** The aim in this strategy is to structure the technology parks as a private, for profit real estate based undertaking (100% privately owned and operated).
- **Model 4:** Hybrid strategy: The technology park is a public private partnership, whereby the state meets the capital and initial (3 to 5 years) operating costs on the basis that private investors will eventually take over the entity.

It is possible to view models 1 and 4 as joint sponsorship strategies and models 2 and 3 as single sponsorship strategies. The advantages and disadvantages of these respective strategies are outlined below:

7.2.1.1 Joint Sponsorship

Advantages:

- Greater possibility of access to larger sources of funding
- Greater possibility of stability once the project has been agreed and launched

Disadvantages:

- Greater ownership/management complexity
- Less focus due to a need to accommodate a greater number of varying objectives
- Greater possibility of less intimate relationship with the science base
- Greater possibility of 'mission drift' with time

7.2.1.2 Single Sponsorship

Advantages:

- Freedom and autonomy of operation
- Simplicity of ownership and management structure
- Sharper focus on a limited number of objectives for the estate
- Greater interaction between the tenant companies and the science base

Disadvantages:

- Greater possibility of a reduced scale of funding
- Greater possibility of the resources being curtailed or reduced in retrospect
- Greater possibility of the project being aborted
- Possible change of use at a later date

7.2.2 Financing Technology Parks: Some Statistics and Examples

Some global statistics with respect to the above strategies are as follows:

- Technology parks owned by the public sector (such as governments of different levels, public-funded foundations or public-funded universities) represent approximately 33% of the existing technology parks in the world. Whereas public and private sector joint ownership amounts to approximately 30%[4]

- Most of the technology parks in the USA are university based and receive private sector funding and federal government support through the Small Business Innovation Research Program and state and local government assistance in the form of direct funding and R&D, development of high-technology initiatives and tax incentives

- In excess of 60% of technology parks in the UK have public funding and conform to model 1. Eleven percent (11%) of the investment in technology parks in the UK comes from universities.

- While in the US there is a diversity of technology park sponsorship, in the new industrializing countries (such as China, Taiwan and to a lesser extent India) technology parks usually rely on a strong government support and conform to model 1 or 2

- In China, there are 44 national level and 124 university science parks (according to the year 2003 information) that rely on strong government support under China's Torch Program

- With regards to technology incubators, the most common sponsors of incubators are academic institutions (25 percent), government (16 percent), economic development organizations (15 percent) and for profit entities (10 percent). However, 19 percent of incubators have no sponsoring entity[1].

Some global examples with respect to the above strategies are as follows:

- The Raleigh-Durham Research Triangle Park (RTP) is one of the largest research parks in the United States. The Park is owned by the private, not-for-profit Research Triangle Foundation. The Research Triangle itself is named for the Triangle formed by the three cities and universities: Duke University at Durham, the University of North Carolina at Chapel Hill, and North Carolina State University at Raleigh. The Park was created when local community leaders from universities, business, and government cooperated to create what has become one of the most successful planned science park in the world, the Research Triangle Park, and one of the world's most diverse research institutes, the Research Triangle Institute. Both the Park and its centerpiece, the Institute, came into formal existence at the end of 1958. Their seed money $2 million between them came from anonymous private donations.

- Manchester Science Park: is a joint venture, started in 1984, between Manchester City Council, all three universities in Manchester (Manchester University, UMIST and Manchester Metropolitan University) and a number of commercial organizations, including Ciba Specialty Chemicals, Pochin's plc, Granada TV, 3i plc and the National Westminster Bank plc.

- Surrey Research Park: is one of the largest science parks in the UK. The University of Surrey is the sole investor in the Park, which is a 280,000 square meter, low density, development close to its campus. Surrey Research Park provides an attractive, high-quality working environment for over 110 companies employing around 2,750 people on site. Many of the tenants are from overseas; mainly from the United States, but also Canada, India, Japan, Sweden, Finland and Iceland.

- The Software Technology Parks (STP) is instituted by the Department of Electronics of the government of India as an autonomous organization (Software Technology Parks of India - STPI). STP unit is considered a free zone in India, and all imports to STP units are duty free. STP units are exempt from payment of income tax for a block of five years in the first eight years of its operation under Section 10 A and 10 B of Income Tax Rules.

- The Hungarian government decided in 1996 to sponsor the creation of an information technology park (INFOPARK) in Budapest. The government provided a site for the park and adjoining the buildings of the Budapest Technical University and the Faculty of Natural Sciences of the Budapest University. A joint stock company – the InfoPark RT - was established at the initiative of the Ministry of Industry and Trade with the purpose of administering the INFORPARK as a business venture. The company was incorporated in December 1996 with the Ministry of Industry and Trade taking 75% minus one share, and the two universities jointly holding 25% plus one share. To facilitate the build-up of the park, the government simplified permit and registration regulations for tenant companies. In April 1998, the InfoPark RT and a German consortium established a joint venture with registered capital of 340 million Saudi Riyals (HUF 1.8bn) to develop the InfoPark. Deutche Telecom and Industrie Vermogens Gesselschaft Immobilien GmbH provided 238 million Saudi Riyals (HUF 1.26 bn) of the new company's capital. The InfoPark RT will contribute the 142,000 square meter site. The Ministry of Industry and Trade and also transferred the management of its assets in InfoPark RT to the national technical development committee (24%) and to the Hungarian Development Bank (49%) and will retain a single share.

- In August 1988, China's national high and new technology industrial development plan, namely the Torch Program, was put into effect. One of its important components is to finance and establish the National Science and Technology Industrial Parks STIPs, and new & high-tech innovation centers. Following the Torch Program, local governments across the country began to set up STIPs in compliance with local conditions. Since 1991, 53 science and technology industrial parks have been approved to be National STIPs by the State Council and they all benefit from having special economic zone status. Over the past years, STIPs have made great strides, achieved tremendous successes, and found a new path of China's characteristics in developing high and new technology industry.

- The Multimedia Super Corridor (MSC) is Malaysia's initiative for the global information and communication technology (ICT) industry. Conceptualized in 1996, the MSC has since grown into a large ICT hub, hosting more than 900 multinationals, foreign-owned and home-grown Malaysian companies focused on multimedia and communications products, solutions, services and; research and development. *The Multimedia Development Corporation* MDC was established by the Government of Malaysia in 1996 to spearhead the development and implementation of the

MSC. MDC expedites all applications to locate or re-locate to the MSC by local and multinational companies and is responsible for the marketing of the MSC, locally and globally. It also shapes MSC specific laws, policies and practices by advising the Malaysian government and standardizes MSC's information infrastructure and urban development.

- The Sophia Antipolis Science Park is located in Southern Europe on the French Riviera, between Nice and Cannes, and presently covers 2,300 hectares (to be extended to 4,600 hectares in the near future). The park was founded in the sixties by Senator Pierre Laffitte, then Director of the prestigious "Ecole des Mines" in Paris. Together with a group of scientists and other key figures, Laffitte decided to create a city of learning, science and technology in the area of Valbonne north of Cannes. The aims were to create and develop an economic centre focusing on high technology so that Provence-Alpes-Maritimes-Côte d`Azur region could become one of the major centers of economic development in Southern Europe. But Sophia Antipolis would not have become a reality had it not been for concerted action on a local and national level lead by the French minister at the time, Jean-Marcel Jeanneney. The actual launch of Pierre Laffitte's ideas was then quickly taken up and developed at the State level and all local authorities worked together to bring about this project. In 1962 IBM and Texas Instruments were the first two companies of the new science park. University of Nice as well as other engineering schools settled down in Sophia Antipolis to benefit from its dynamism. The park was made official by the Comité Interministériel d'Aménagement du Territoire (Interministerial Committee for Land Development) in April 1972, led by a joint syndicate developer, in 1974, under the name of SYMIVAL, which then became SYMISA. The development of the park was very successful, and each year at least 30 new companies set up there, coming from all countries: United-States, Germany, United-Kingdom, Italy, and so one. In 1999, the Sophia Antipolis Science Park generated 2000 jobs.

- In Ireland, a partnership approach between the public and private sectors has been adopted towards the development of high quality business parks that cater exclusively for firms involved in internationally traded services activities, such as software development and ICT, high tech manufacturing and the development of life sciences such as biotechnology. In general the role of the state and local authorities in Ireland has been to:

- Donate land (sometimes in socially deprived urban areas or marginalized regional areas)
- Provide tax incentives to developers and investors
- To promote the technology through agencies such as IDA
- To grant special incentives to companies locating in the zones such as rent subsidies (through agencies such as IDA) on a case by case basis
- To guarantee rents to developers for a period of time on a case by case basis (again through agencies such as IDA).

And the role of the private sector has been to:

- Develop the land
- Construct buildings
- Rent buildings to both indigenous and foreign-owned firms meeting the criteria for establishment in the park on a commercial basis
- Sell buildings to both indigenous and foreign-owned firms on a commercial basis provided that the buildings are occupied by firms engaged in the approved technologies
- Provide management services for a fee
- Raise funds through the sale of equity in the technology zone development company.

However, in cases where risks are perceived to be exceptionally high, for example the construction of technology incubators in regional locations, the state assumes most of the risk of construction and operation in the initial phases of the project. In addition to the incentives outlined above, all firms in Ireland now have access to a rate of corporation tax of only 12.5% on trading profits and firms engaged in manufacturing and internationally traded services activities also qualify for a broad range of cash grants such as employment grants, management development grants, R&D grants, training grants etc.

7.2.3 General Finance Sources for Technology Zones

Technology Zones are large geographic areas, designated by government officials and established to attract technology oriented companies to locate in a specific area. Technology zones usually offer a broad range of tax and investment credits, grants and other incentives to lure target industries. Firms that locate in technology zone usually need to apply to the management authority to become eligible for benefits.

Unlike parks, which are centered on relatively small geographic area, perhaps 10-200 acres, technology zones are measured in square miles. Technology zones usually do not have active management teams engaging with the tenants as do technology parks and will often have a much greater variety of non-technology companies and industries do to their relatively large geographic focus.

Examples of prominent technology zones include:

- Wisconsin Technology Zone Program

  (http://www.commerce.state.wi.us/CD/CD-bed-tz-general.html)

- Buena Vista Technology Zone in Virgina, USA

  (http://www.buenavistavirginia.org/tech_zones.htm)

- Malaysia Multimedia Super Corridor

  (http://www.mdc.com.my/)

- Shenyang Economic and Technological Development Zone

  (http://www.sydz.gov.cn)

There is a need to finance technology zones for two purposes:

1. Fixed capital investment

2. Working capital for management and operation

7.2.3.1 Fixed Capital Investment

In this category, funding may be required for:

- Acquisition of land
- Securing basic services to the site (i.e. roads, electricity, telecommunication, water)
- Installation of infrastructure
- Construction of individual buildings

The balance between these categories of expenditure usually depends on the type of park and its master plan.

7.2.3.2 Working Capital Investment

Working capital is required to cover:

- Management expenses, including the start-up costs that relate to the preparation of a feasibility study, market research, physical planning, promotion, administration, and preparing a business plan.
- The provision of services to tenants and interest on any outstanding loan capital until such time as income from rents and other charges can pay these costs.

Once fully developed and occupied, the subsequent requirements for working capital may be relatively small as rents and service charges are usually paid in advance. However, the requirement for this working capital should not be underestimated; it will depend critically on[5]:

- The local economic environment of the area in which any park is proposed; this will influence, for example, rental levels, the rate at which buildings might fill and the cost of any services that might have to be brought in, to undertake any initial planning. In areas of serious economic difficulty, grants should be made available to support the early stages of planning any technology zone.
- The stage of development of any feasibility study and business plan.

- The land use planning position of the proposed site: the cost of obtaining planning permission, master planning work, an environmental impact study, and obtaining planning permissions.

- The state of the property market will have major influence on the extent of voids in any buildings or land.

7.2.3.3 Major Sources of Finance

The major sources of finance for technology zones are shown in Table 7-1. The relative extent to which these different sources are utilized will depend on the nature of the park sponsors, the way in which they are involved in the investment, land management structure of the park, and whether or not they are the owner of the site selected for the project.

Table 7-1 Sources of Finance for Technology Zones

Source of Funds	Needs for Funds	Applications
Ready assets of sponsor Value of Land Interest bearing loan Sale of equity	Fixed capital investment	Land purchase or payment for long lease-hold interest Infrastructure development Building construction Leases on Buildings Interest on Loans
Grants or subsidies Re-invested profits Sale of Buildings	Working Capital	Financing of voids Management Costs

Source: The planning, development and operation of science parks, by Malcolm Parry and Peter Russell (eds.), UK Science Park Association, 2000. ISBN 1-871786- 09-6

7.2.3.4 Funds Held By Sponsors

Funds in this category can be either in the form of commercial money of funds that are channeled into the project as an indirect subsidy through a development agency.

7.2.3.5 Utilizing Land Values

If one of the sponsors controls a substantial parcel of land, either by outright ownership (freehold) or by holding a long lease, this may be utilized to finance the development of the park. The practicality of this depends on the value of the land, and this varies widely with location, and permitted use. While the technology zone usually cannot control the location it may be able to increase the potential value of its land by obtaining planning consent to a more profitable permitted use and it is this profitability to an investor that determines the land value.

7.2.3.6 Interest –bearing Loans

Loan finance is probably the most common method for long term funding of technology zone developments in the areas where market rents are sufficiently high to cover the required interest payments. We can distinguish two main types of loans depending on the use for the funds.

7.2.3.7 Short Term Finance

A loan may be obtained to cover the cost of constructing a building that is either sold on to an outside institution as soon as it is fully let or direct to an owner occupier. In this case, the funds are required for a relatively short period, perhaps three or four years, and capital repayments are not required during this time as the whole loan is repaid when the building is sold.

7.2.3.8 Long Term Finance

In this case, the loan is intended to finance the building over a long period and is appropriate when the park intends to hold ownership of the building and benefit from the total control of its use as well as profiting from rental growth and the resulting increase in value of the building as a capital asset. The interest rate on the loan is commonly tied in some way to a published base-lending rate and this can vary widely depending on fiscal policy and market conditions. The interest rate demanded by the lender, expressed as a premium over the base-lending rate, depends on the financial status of the park and the perceived risk in the project.

7.2.3.9 Sale of Equity in the Park

Historically, this has been an unusual method for financing technology zones mainly because property specialists have regarded the profitability as questionable. However, today this route may be sufficiently attractive to secure an equity partner especially in areas where parks have significant values. To achieve this kind of sale it is first necessary to create a suitable legal entity, e.g. a private company limited by shares in which a stake can be bought. This is a common method of arranging the management and control structure of park and has many other advantages.

7.2.3.10 Grants and Subsidies

Many technology zones have been promoted in areas suffering poor economic performance because of the effects of recession and the decline of traditional industries. In these areas, it is usual that a major objective of development is regeneration of the local economy. However, under these conditions rents are likely to be low, and commercial returns poor, in the short term, it will be virtually impossible to obtain adequate funding from conventional sources. However, experience in Ireland and other countries shows that, over time, some of these technology zones proven to have been a key factor in the successful regeneration of formerly marginalized areas and have become commercially viable investments, with the capacity to command good rents. Eastpoint IT Park in Dublin is one such example. It was constructed in a socially deprived area but over a period of seven to eight years has become one of the most successful business parks in the country.

7.2.3.11 Re-investment of Profits

For the very mature technology parks with a large rental stream and relative low financing costs, there may be scope for reinvestment of profits in the physical development of the park, either on further improvements in the infrastructure or on new construction, such as incubator buildings for which commercial loan finance to cover the whole cost may be difficult to obtain. Up to this time, such re-investment has rarely been sufficient to make a real impact on the fixed capital requirements of the technology zone.

7.2.3.12 Sale of Buildings

Once technology park buildings are fully let to tenants they represent a capital asset, which should have steadily increasing value as rental income increases at periodic rent reviews, and market rents in the locality increase with normal inflation. In principle, it should be possible to sell such buildings to institutions such as insurance companies or pension funds in order to obtain capital land, which can be reinvested in the park. The difficulty of retaining adequate control of the property, particularly in the choice of tenants who may be admitted to it, is a possible objection to such a sale. The value placed on a building is linked not only to the rent it generates but also to the quality of the tenants' covenants which depend on, for example, their profitability, financial stability and reputation. There are various types of partial sale, rental stream splitting or sale-and leaseback arrangements that may be considered by the sponsor as alternatives to a straightforward sale, but they are too complex to be described in detail here. As soon as disposal of a building for finance is being considered it is essential to seek professional advice before negotiations are undertaken.

7.2.3.13 Development Appraisal

The analysis of investment and return on buildings is a specialized field that has developed since the 1970s and remains a field that is highly complex. However, a number of methods have been developed that are routinely used by those investing in buildings. These include the standard techniques of calculating Net Present Value (NPV), Internal Rates of Return (IRR) and Residual values as part of an overall analysis. NPV, also known as Discounted Cash Flow (DCF), calculates a cash-flow from an investment that is adjusted to allow for the timing of cash inflows and outflows and potential interest rates. Allowing for the timing of investments is important as most investments have their greatest costs up front while cash inflows are spread over many future years.

7.2.3.14 Service Charges

Once a technology park is operational, funding the running costs of the development needs to be considered. The usual arrangement is to create a service charge. In the simplest case this service charge has to pay for a range of annual revenue costs that include, for example, the maintenance of landscaping, sweeping and gritting roads and the upkeep of signs. It is usual that each of the occupiers contributes to this service charge and the way this is apportioned is normally set out in the contract for occupation, in the service charge schedule. However, whether the cost of director or other staff should be included in the service charge is a matter for careful consideration when the park is being planned. If the park comprises a series of single occupier buildings that are on fully insuring and repairing leases, the number of services that have to be funded are fewer than where a park includes an incubator centre or other multiple occupier blocks in which cases the range of services will increase. In addition to providing for the revenue costs associated with site maintenance there is a need to make provisions to cover long-term capital expenditure on buildings and infrastructure. It is useful to employ a building surveyor to predict these costs and set them out in a 25 to 40 year planned preventative maintenance and replacement program to help establish how much should be collected from each tenant as a contribution to a sinking fund through which to pay for this long term work. Creating sinking funds may include tax liabilities and will require careful documentation.

7.2.4 Influence of the Technology Zone Organization on Funding Strategy

The three basic modes of technology zone organization are:

- Land owner as sole sponsor. Land owners could be an Industrial Development Authority (such as SOIETZ in KSA or IDA in Ireland), a university, a research center, or a private sector company.
- Collaboration based on a joint venture.
- Company based organization.

The choice of organization has a considerable effect on the options available for financing and this, apart from any other reason, makes it essential to establish the organization as quickly as possible after the project is conceived.

7.2.4.1 Funding Where the Land Owner is Sole Sponsor

This structure usually arises where the sponsor owns the land that forms the basis for the development of the park. This ownership provides a good basis for acquisition of funds to install the site infrastructure required for incoming tenants or developers, either by borrowing money using a lease of the lands collateral or by selling a long lease on part of the land for cash, which is used to pay for infrastructure on another part of the site. In the early stages of the development of a science park it is highly desirable to provide at least one multi-unit building to offer rented accommodation to new or small companies on a relatively short term basis. The financing of such 'incubator' buildings is particularly difficult for the land owner as sole sponsor. It may be able to arrange for construction of a building on its land by a property developer on a speculative basis, but it is likely to be difficult to achieve agreement on the letting restrictions that the land owner will wish to impose in order to ensure that the park accepts only appropriate technology-based companies. In financing the management structure of the park, the land owner is in a favorable position if it can use its own administration as basis.

7.2.4.2 Funding of Collaborative Joint Ventures

Collaborative joint ventures usually include a local authority or development agency that already owns, or has the ability to acquire, land and has sufficient resources to install the required infrastructure. These sponsors, within their remit to assist with economic development have often been able to provide capital for central buildings to initiate the development of technology zones. It may be found, however, that further injections of public money are hard to obtain and, at this point the park will have to find other means to finance new buildings. With these collaborative joint ventures, the initial fixed capital expenditure should not be a problem, but the financial benefit to the park from the exploitation of these resources may be minimal. Care must be taken to ensure that the operating expenses of the park can be funded on a continuing basis. Common sources of funding longer term running costs include local authorities and development agencies, and experience suggest that many carry, at least for an initial period, part of the marketing costs of a new development as a social contribution to the park's function as a creator of local employment and wealth generation.

7.2.4.3 Funding of Technology Parks Organized as Companies

These companies face similar difficulties to the collaborative joint venture approach and enjoy corresponding advantages, but they have better opportunities, because of their fiscal structure, to use a greater variety of financing methods. Where land is owned by one of the participating shareholders it may be transferred to the company in return for equity, or it may be leased to the company on a long lease at nominal rent in return for an undertaking that the company will develop it through investment in buildings or underlease to tenant developers. Income from such development will then be shared between the company and the original owner of the land, and the company share may help to pay the management expenses of the park. This method is particularly appropriate when a local authority owns the land, and would normally be unwilling to surrender this freehold in the land. The initial setting-up and operating costs of a technology zone organized as a company may be paid from equity capital subscribed by the sponsor.

7.3 Perceived Importance of Different Modes of Finance by Managers and Tenants

According our analytical GLOINTECH model of KSFs, Factor Conditions are one of the important factors in the success of any technological park. In order to assess the relative importance of Factor Conditions, we measured this variable using three factors as the availability of labor, the availability of capital and the availability of infrastructure. We presented the detailed results regarding the KSF's and role of each of the twelve factors in the previous chapter. Here it is important to mention that "Availability of Capital" was one of the very important variables (part of Factor 4 which was of the 2nd highest importance) in explaining the variation in the relative success of parks all over the world.

Table 7-2 presents the relative importance of a comprehensive set of sources of financing as a part of the Availability of Capital Factor. We had asked both managers and tenant respondents to rate the importance of the various types of sources of finance in the success of technology parks in general. The sources of finance that we asked them to rate in terms of their importance were as follows:

- Availability of venture capital
- Availability of government funding
- Availability of commercial financing
- Availability of traditional bank financing
- Availability of international funding

The distribution of average scores for managers and tenants indicate that managers tend to assign slightly higher importance to the elements of finance in general than the tenants although there is an almost perfect match between the opinions of these two groups regarding the importance of ranking of these five methods. Availability of venture capital was identified by both the groups as being "somewhat important" followed by the availability of government funding. Similarly both the groups assign least importance to the availability of international funding.

Table 7-2 Relative Importance of the Elements of the Factor: Availability of Capital to Park Management Indicated by Managers and Tenants Respondents

Elements of Finance	Average scores by Managers	Average scores by Tenants
Availability of venture capital	3.39	2.88
Availability of government funding	3.08	2.82
Availability of commercial financing	3.05	2.51
Availability of traditional bank funding	2.92	2.55
Availability of international funding	2.47	2.45

Source: TEMBA Survey of Park Technology Management and Tenants Worldwide, 2006
Note: 1=Not important at all, 2=Less important, 3=Somewhat important, and 4=Very important

7.4 Prevalent Modes of Finance in Technology Parks Worldwide

In order to find out the popularity of different modes of finance used by companies in technology parks all over the world, one of the questions we asked in our surveys of managers and tenants of parks related to finance. To the managers, we asked: "What amounts of the following types of finance are used in your technology park?" We gave them a list of 12 modes of finance we identified through our extensive review of literature. These twelve modes of finance were:

- Angel financing
- Private venture capital financing
- Private equity financing
- Corporate venture capital financing
- Venture leasing

- Commercial bank loan financing
- Traditional equity finance/IPOs
- Other commercial loans (e.g. corporate bonds)
- Government-backed/subsidized private loans
- Direct loans
- Government R&D grants and loans
- Self-funding (family, friends and fools – 3Fs)
- Other *(please specify type)* ____________________

The survey question and the list of modes of finance appear in Question 10 of the survey of managers. They were asked to rate each mode using a five point scale which represented relative use of these modes of finance. The results are presented in Table 7-3.

In Table 7-3, the last five columns show the distribution of the frequency of responses to each question. Using a five point scale, we also present the average scores for each of the 12 modes of finance on the second column of the figure. Results show that the leading modes of finance in practice as per the managers are Government R&D grants & loans and Self-funding both of which had the highest mean score of 3.24. About one half of respondents indicated using Government R&D grants and loans mostly (13%) and often (36%). Similarly, 19% of the respondents indicated using mostly the "self-funding mode" and 23% indicated using it often. The second set of modes of financing that were relatively used often was "private equity financing" (3.17), "commercial bank loans" (3.08) and "private venture capital financing" (2.94).

The other modes of finance had mean value significantly lower than 3.0 indicating that a large percentage of respondents (>70%) did not use them mostly or often. The mode of finance that was listed at the bottom based on its mean score was "venture leasing" which received a mean score of 2.0 or "used rarely." Actually this method was not offered in the case of one-third of the respondents in their parks and was indicated to be used rarely by 41% of the respondents. The "direct government loan" was second from the bottom in the extent of its use with a mean of 2.23. Out of three methods of financing provided by the government, "government R&D grants and loans" led all the rest of the modes of financing. However, the other two methods (government backed/subsidized private loans and direct government loans) were listed at the bottom in their extent of use. Other private modes such as self-funding, private equity financing, and commercial bank loans were the other principal sources of finance along with government R&D loans.

Table 7-3 Different Modes of Finance Used in Technology Parks as Reported by Park Management

Types of financing methods in practice	**Mean**	**Used mostly (>70%)**	**Used often (31-70%)**	**Used sometimes (10-30%)**	**Used rarely ((<10%)**	**Not offered**
		5	4	3	2	1
Government R&D Grants & loans	3.24	13.1%	35.5%	21.5%	22.4%	7.5%
Self-funding (3F's)	3.24	18.5	23.1	29.6	21.3	7.4
Private Equity financing	3.17	6.5	36.1	36.1	10.2	11.1
Commercial bank loan	3.08	11.0	22.9	36.7	22.0	7.3
Private venture capital financing	2.94	3.7	24.8	41.3	22.9	7.3
Corporate venture capital financing	2.81	3.7	23.1	34.3	27.8	11.1
Angel financing	2.61	2.9	21.9	30.5	22.9	21.9
Traditional equity finance/IPO's	2.44	1.9	13.0	32.4	33.3	19.4
Government backed/subsidized private loans	2.40	0.9	12.8	33.9	30.3	22.0
Other commercial loans	2.25	0.9	11.1	25.9	36.1	25.9
Direct government loans	2.23	3.7	12.1	20.6	30.8	32.7
Venture leasing	2.07	2.8	5.7	18.9	40.6	32.1

Source: TEMBA Survey of Technology Park Management Worldwide, 2006

We also asked a similar but a more pointed question to the tenants of parks surveyed regarding the modes of finance used by their companies. The question was as follows: "Which of the following types of finance are used by your firm in the technology park you are currently in?" The same list of 12 modes of finance were given to them asking them to check whether they "used" or "did not use" these modes of finance. This question appears in Question 10 in the tenant survey. Results of responses to this survey question are presented in Table 7-4.

Table 7-4 Percentage of Tenant Respondents Using Different Modes of Finance

Types of financing methods in practice	**Percentage of users**
Government R&D Grants & loans	59%
Self-funding (3F's)	52%
Private Equity financing	24%
Commercial bank loans	29%
Private venture capital financing	26%
Corporate venture capital financing	26%
Angel financing	20%
Traditional equity finance/IPO's	16%
Government backed/subsidized private loans	14%
Other commercial loans	13%
Direct government loans	16%
Venture leasing	6%

Source: TEMBA Survey of Tenants of Technology Parks Worldwide, 2006

The results presented in Table 7-4 very closely match with the responses of managers presented in Table 7-3. More than 50% of the respondents indicated that they used Government R&D Grants & loans (59%) followed by Self-funding (52%). These were the two dominant methods identified by the managers as well. About one-quarter of the respondents used modes of finance such as private equity financing (24%), commercial bank loans (29%), private venture capital financing (26%) and corporate venture capital financing (26%). About 13% to 20% of the respondents indicated using other modes. Similar to the result from the survey of managers, venture leasing received the lowest percentage of use (6%).

The responses of these two groups of respondents match significantly in terms of the popularity of modes of finance in different technology parks. These results suggest that except for R&D grants and loans received from governments, government is not a popular source of funding. Actually, most of the funding seems to come from private sources whether they are self-funding, private equity, private or corporate venture capital and angel financing. Commercial bank loans also seem to play an important role.

7.5 Summary

In this chapter, we presented an analysis of the principal modes and models of financing technology parks. We then discussed the major strategies used for technology park financing and provided some key examples of the type of financing used by successful technology parks. We then provided a detailed discussion of the options and practices of financing technology zones and parks. We concluded this chapter by presenting the findings of the results of our technology park manager and technology park tenant survey. This analysis identified the key modes of finance that were used by tenant firms and the perceptions of both managers and tenants for the relative importance of these modes of finance. We concluded that, except for government R&D loans, the major sources of financing were private.

The next chapter provides an overview of the marketing mix used by technology parks in attracting and keeping tenants in these parks.

7.6 Sources – Chapter 7

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Chapter

8

8.0 Marketing of Technology Parks

8.1 Introduction

This chapter provides an overview of the marketing mix elements that are used in selected technology parks worldwide. It outlines the elements of marketing strategy that a park like Sapiens Parque can use to market itself. It also presents the results of survey questions related to desired park services and park promotion practices. These questions were asked of worldwide technology park managers and park tenants in order to provide Sapiens Parque management with clear guidelines on how to promote the park and how to match the criteria that managers use to choose a park location.

First, we look at the elements of Product, Promotion, Price and Place as they apply to technology parks and provide some information on how these elements are currently implemented in the technology park community. We also briefly look at the issue of Positioning of technology parks. We focus on the immediate question of how to promote Sapiens Park based on the results of our Worldwide Survey of Technology Park Managers and Technology Park Tenants.

8.2 Product (and Services)

The basic products that technology parks provide are their services to business buyers rather than consumers. These business buyers have different rationales for their purchases of park services than would business buyers of industrial products or consumers of consumer products. The basic technology park product and the services it entails are all means to solving the business buyer’s problem of finding an optimal location that provides the services to make money or to reduce operating and transactions costs or meet strategic objectives or for social/legal obligations.

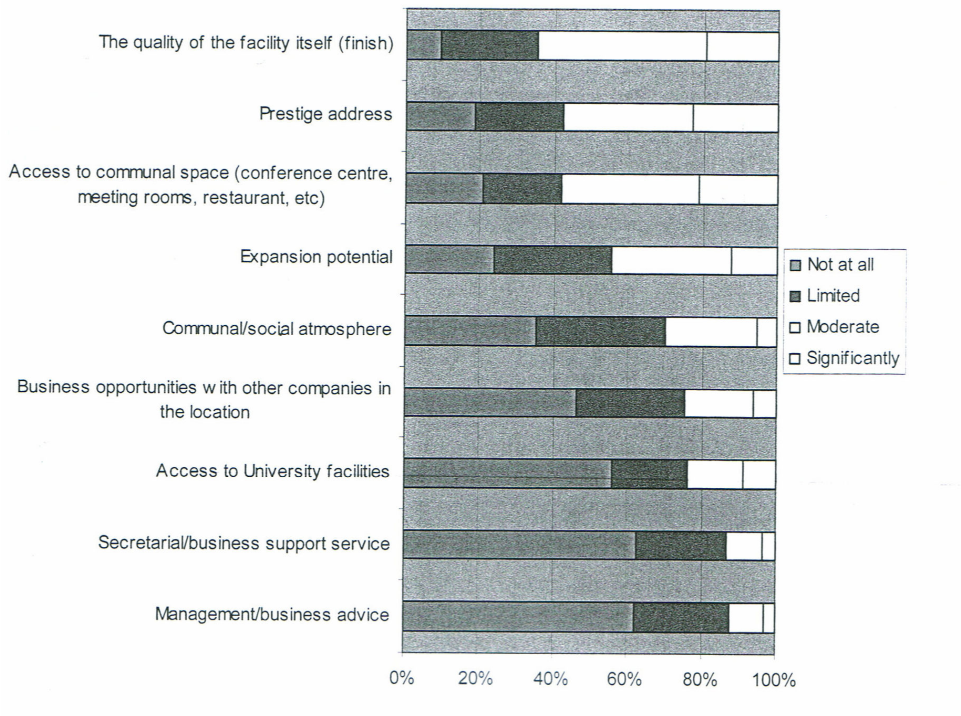
Science parks can be positioned in the market to solve the many problems that start up companies or mature technology companies experience. Reasons for locating in technology parks include some or many of the following:

- The image or reputation it gives the company
- Location in relation to the customers or suppliers targeted by the company
- Location in relation to goods and services required by the company
- Access to skills and pools of competent skilled labor/management
- Room for expansion
- Access to university or research facilities
- Good transport and communication links
- Access to a variety of different sized units that allow networking between spin-outs and the mother company
- Provision of on-site management and common services
- Proximity to experienced venture capitalists, other financing sources, accounting, tax and legal services
- Meeting strategic objectives such as being near a competitor or supplier or customer

Figure 8-1 shows responses on a 2003 survey done by the United Kingdom Science parks Association (UKSPA) on the Reasons Companies Choose to Locate in Science Parks. The results clearly show that the major reasons in selecting a science park location (as measured by the “Moderate” and “Significantly” responses) were:

- Overall image and profile of the site
- Expansion potential
- Good transportation and communication links
- Cost of the premises

Figure 8-1 Reasons Companies Chose to Locate in a Science Park



Source: UKSPA Science Park Survey, 2003

These results stress the importance of physical infrastructure attributes as against soft factors in the selection of a park by tenants. Technology parks can then hone in on these and other attributes to design their optimal product and services offering.

The surveys conducted by the GLOBUSTRAT team also provide some very useful pointers towards understanding the kind of technology park product and services package that Sapiens Parque must provide in order to be successful.

The results of Question 7 of our Tenant Survey asked the following question:

"Please review the list of factors given below and check the five (5) factors you believe are the most important selection criteria for locating in a technology park like the park you are currently in?"

- ☐ Location of park
- ☐ Quality of park management
- ☐ Lack of bureaucracy
- ☐ "One-stop shop" access model
- ☐ Clear/simple policies/procedures
- ☐ Government support
- ☐ Incentive package
- ☐ Quality/nature of tenants
- ☐ Your company's goals
- ☐ Services Offered
- ☐ Industry focus/foci
- ☐ Nature of customer service
- ☐ Public-private partnerships
- ☐ Market considerations
- ☐ Trade / industry certification
- ☐ Funding availability
- ☐ Comparative investment cost
- ☐ Other *(specify)*___________

The responses to this question are presented in Table 8-1 below. It can clearly be seen that the location of the park is the dominant choice criterion for locating in a particular park. This is followed by the industry focus of the park and the company's strategic goals. Since these three choice criteria are not controllable or changeable by Sapiens Parque management (with the possible exception of industry focus but this is fraught with difficulty), it is the factors that follow that become pertinent. Thus, Sapiens Parque management must pay careful attention to the quality of its park management, its incentive package and government support, the services offered and the quality and nature of its tenants if it is to succeed in attracting the required tenants and investment for its sustainability and long-term success.

Table 8-1 Tenant Firms' Choice Criteria in Choosing Park Location

Choice Criteria	Tenants	%
Location of park	41	80%
Industry focus of park	25	49%
Company's goals	22	43%
Quality of park management	21	41%
Incentive package	15	29%
Government support	14	28%
Services offered	14	28%
Quality/nature of tenants	14	28%
Nature of customer service	11	22%
Funding availability	11	22%
Comparative investment costs	11	22%

Source: TEMBA Survey of Technology Park Tenants Worldwide, 2006

Since the location of the park as the single most important criterion for park selection comes from the criterion of the industry focus of the park, it is important to see what product offerings there are in the technology park industry worldwide in terms of the industry focus of these parks. Based on our analysis of secondary research, we found five types of technology park offerings, which are the following.

- Single Purpose technology parks
- Limited focus - multi purpose technology parks
- Multi focus – multi purpose technology parks
- Incubators
- Hybrid

Each one of these is briefly described below.

8.2.1 Single Purpose Technology Parks

These types of technology parks are focused on specific industries or technological fields such as biotechnology, semiconductors and manufacturing only. For example, the Virginia biotechnology Research Park (see Figure 8-2 below) is a dynamic biosciences community strategically headquartered in downtown Richmond, Va. With more than 1.2 million square feet of space in nine buildings, the park employs more than 2,000 scientists, researchers, engineers and technicians in fields that include drug development, medical diagnostics, biomedical engineering, forensics and environmental analysis.

Figure 8-2 Virginia Biotechnology Research Park

8.2.2 Limited Focus – Multi-purpose Technology Parks

These parks are generally more focused on new economy products like software or IT but also provide other business support services like legal, accounting, consulting and logistics services organizations in their parks such as the software technology park in Bangalore, India and Hitech City in Hyderabad, India (as shown in Figure 8-3 below).

Figure 8-3 Hi-tech City in Hyderabad, India

8.2.3 Multi Focus – Multi-purpose Technology Parks

These types of parks are diversified over all technology and industry areas such as telecom, software, hardware, financial services and biotechnology. For example – the Research Triangle Park (RTP) in North Carolina encompasses 7,000 acres of North Carolina pine forest and has approximately 1,100 acres for development. It is home to more than 136 companies which employ 37,600 workers in a variety of industries ranging from IT, software, hardware, telecommunications, biotechnology, pharmaceuticals, chemicals etc. The combined annual salaries in RTP amounted to over $2.7 billion dollars in 2004[1].

8.2.4 Incubators

These types of parks generally play a role in emerging technology companies that are in the start-up or incubation phase. They provide them management and organization experience in addition to space as part of a "GOTO" market strategy. Once these companies mature from their initial development stage, these parks graduate them from their facility and search for new entrepreneurs to back fill these spaces. For example, the Thailand Technology Park in Bangkok, Thailand and the San Jose Software Business cluster (SJSBC) are two business incubators that specialize purely on start-up firms and are somewhat focused in their industry and technology coverage.

8.2.5 Hybrid parks

These types of parks are diversified more than multi-focus parks. Their offerings include in retail, banking, hotels, and tourism in addition to technologies such as software, hardware, biotechnology and telecommunications. The Hacienda Business Park is a good example of this type of park.

It would seem from our review of the literature that Sapiens Parque may be well placed with its multi-focus multi-purpose concept but as shown in the next section this concept needs to be carefully positioned and promoted to prospective tenants.

It is also important to recognize that different technology parks offer different product features or bundles of product features. Our analysis of the secondary sources and technology park web-sites revealed the following types of product offerings from technology parks worldwide:

- One Stop Shop (Bundled service offerings)
- Research & Development Centers

- Corporate Offices & Center
- Environment friendliness-oriented
- Production Facilities Oriented
    - Assemble to Order

    - Configure to Order

- Support services oriented

It is important for Sapiens Parque management to select a bundle of features based on market research with focus groups, expert interviews and surveys that can meet client needs. This study has tried to fill this gap by most types of market research being conducted globally.

8.3 Promotion

In order to identify the popular means of promotion used by technological parks all over the world, we included a question in our surveys of both management and tenants of technology parks. For the management survey, we asked the question: *"Please indicate the methods of promotion you most frequently use to promote your technology park."* We gave them a list of 15 means and channels of promotions including one "other" category and asked them to "check all that apply." As the nature of the question indicates, our objective was to identify the most dominant means/vehicles of promotion used by park management.

On the other hand, our question to tenants was worded a little differently: *"What do you believe is the best way to promote a technology park to prospective companies like yours?"* We gave them the same list as we gave to the park management. Since tenants know what worked for them, it was essential to get their perspectives of the best ways to promote parks. The responses of these two groups are presented in Table 8-2 below.

In Table 8-2, the first column shows the list of promotion means/vehicles we had listed in the survey. The next two columns indicate the frequency of responses by management and the frequency converted into percentages of respondents who selected each of those categories. Similarly, the last two columns indicate the frequencies and the percentages of tenant-respondents who chose each of those categories. The top three means of promotion identified by the majority of management respondents are: direct contact with potential clients (86%), distribution of promotional brochures (81%), and referrals by park clients (74%).

Direct contact with potential clients (59%) and referrals by park clients (65%) are also identified by tenant-respondents as the top two means of promoting parks.

Table 8-2 Means/Channels of Promotion Identified by Managers and Tenants

Means of Promotion	Management frequency	Management %	Tenant frequency	Tenant %
Direct Contact with Potential Firms	97	86%	29	59%
Distribution of Promotional Brochures	91	81%	19	39%
Referrals by Park Clients	83	74%	32	65%
Promotion through Internet Sites	80	71%	15	31%
Collaboration with Chambers of Commerce	72	64%	20	41%
Collaborating with Government Sponsors	70	62%	22	45%
Attending Road Shows and Conferences	64	57%	19	39%
Membership in Trade Associations	64	57%	10	20%
Participating in Trade Shows	60	53%	16	33%
Advertising in Trade Magazines	30	27%	8	16%
Using Paid Information Providers	21	19%	5	10%
Advertising in Newspapers	20	18%	5	10%
Advertising in Radio	5	4%	1	2%
Advertising in TV	4	4%	4	8%

Source: TEMBA Surveys of Managers and Tenants of Technology Parks Worldwide, 2006

These results clearly indicate that two things must happen for a successful promotion campaign to take effect. The management of a given park must make every effort to directly contact the prospective clients and make forceful representations to persuade them to invest in the park. In addition, given that another method chosen by a large majority of the managers and tenants is "referrals by park clients," this means that the existing clients in the park have to be fully satisfied to make a positive referral to others. Otherwise, the word of mouth may go against the park if they are not fully satisfied. Again, it indicates that the management of the park has to play a very crucial role in both attracting new clients and retaining existing ones. The role of word of mouth clearly indicates that these two activities are highly correlated and management plays a very crucial role in effective promotion of parks. The distribution of promotion brochures, although selected by a large majority of managers (81%) was chosen by 39% of the tenants as an effective means of promotion.

Both managers and tenants have emphasized the roles of collaborating with the government, chambers of commerce and trade associations. An important advantage of collaborating with these organizations is that there is already a list of target "prospects" to start with rather than creating one. The promotion vehicles identified by many of the respondents representing these two groups are internet sites, trade shows and attending road shows & conferences in addition to the distribution of promotional brochures indicated earlier.

One thing seems to be clear from the responses of both groups. Advertising in either electronic or print media is not an effective means of promoting a technology park. This makes sense given the fact that the promotion of a park is not limited to one particular geographical area; it has to be targeted in several geographical areas as a result of which the cost of advertising itself becomes quite expensive. Besides, advertising is not an effective means of promoting such a "high involvement service" such as a technology park.

In order to see how well the ranking (based on frequencies of mention) of these 14 means/vehicles by these two groups match, we computed the rank correlation between them. The rank correlation was 0.758 and significant at $p<.05$. Given that the maximum value of coefficient is 1.0, a rank correlation of 0.76 indicates a high degree of agreement between managers and tenants regarding which means/channels of promotions are more and less effective.

The best practices for the promotion mix identified in the surveys, the expert interviews and the literature are as follows[2]:

- Direct contact with potential clients
- General pubic relations campaign
- CD-ROMS, brochures, newsletters, and fact sheets
- Participating in investment exhibitions
- Business conferences
- Investment missions
- Sector based investment promotions
- Trade missions
- Website to develop the awareness & image

By examining the above mentioned results, we concluded that technology parks are highly relationship-oriented businesses. The majority of decisions to locate research & design, manufacturing, regional office and other facilities are influenced by access to market, business climate, infrastructure and labor pool in the region. As a consequence, face to face contact with anchor firms and real estate brokers plays an important role in establishing contacts for future business. Hence an aggressive promotion strategy[2] is required to ensure that a region's competitive advantages are understood and real estate brokers are informed, work closely with technology park management and push their products in preference to other locations. These could include:

- Financial incentives for certain revenue targets
- Advertising budget for brokers
- Success fees and commissions

Expert interviews at the San Jose Software Business Cluster and Hacienda Park revealed that public relations play a major role in establishing brand name recognition. Many technology parks and their brokers participate in business council forums, trade missions and exhibitions in pursuit of name recognition. Advertising is yet another important factor in building name recognition. Advertisements are contracted in various media including the internet such as on the Association of University Research Parks and the International Association of Science parks website and on regional chamber of commerce websites etc. It is quite clear that the most effective way of communicating with the prospective tenant is to visit them by sending sales representatives.

The second choice is distribution of sales collateral to target companies. In addition, it is noteworthy that promotion through internet sites is also ranked very high by our survey respondents as one of the most important vehicles for promoting technology parks. Our research team also analyzed the sales collateral of various technology parks from around the world. We also analyzed the content provided by 10 websites to understand the impact on brand image and sales leads.

Table 8-3 shows the comparison of sales collateral on a scale of "Poor, Good, and Best" that the GLOBUSTRAT team used to rank the material they compared[3] (it is to be pointed out that this was a purely consensus based informal assessment by our team and cannot to be construed as a scientific study of the material by experts).

Table 8-3 Comparison of Sales Collateral

Parks **Factors**	**Hacienda Park, USA**	**Hsinchu Science Park, Taiwan**	**Research Triangle Park, USA**	**Stanford Research Park, USA**	**Thailand Science Park**	**Multimedia Super Corridor, Malaysia**	**Edinburgh Tech. Park, UK**
Quality of Information	Best	Best	Best	Good	Best	Best	Good
Production quality	Best	Best	Good	Good	Good	Best	Good
Packaged collateral	Best	Best	Good	Good	Poor	Best	Poor
User friendly	Best	Best	Best	Good	Good	Best	Good

Source: GLOBUSTRAT Technology Park Study, 2006

As can be seen from Table 8-3, Hacienda Park in the USA, Hsinchu Science Park in Taiwan and the Multimedia Super Corridor in Malaysia had the best sales collateral followed by the Research Triangle Park and Stanford Research Park. We have provided examples of much of this collateral as Appendix 4 to this report. Sapiens Park management would do well to examine these documents and see which features they should emulate in order to have the best-of-breed sales collateral.

As mentioned above, our research team also analyzed the contents and style of the following 10 websites from four regions of the world:

- Ireland (www.idaireland.com)
- Costa Rica (www.cinde.or.cr)
- United kingdom (www.invest.uk.com)
- Sweden (www.investinsweden.com)
- Singapore (www.sedb.com)
- Research Triangle Park, North Carolina, USA (www.rtp.org)
- Thailand (www.boi.go.th)
- Hacienda Business Park (www.hacienda.org)
- Hsinshu Science Park (www.sipa.gov.tw)
- Malaysia (www.mida.gov.my);

The key types of information[2] being offered on the above websites include:

- Geographical location and market access (with maps).
- Labor costs and availability and labor skills and education.
- Property and site costs availability through photographs, virtual tour and search functions.
- Infrastructure quality and costs (transportation, utilities, telecommunications, Internet).
- Technological infrastructure (R&D, patents, university-based clusters, graduates).
- Joint venture partners search function.
- Information and links to sub-national regions.
- Corporate climate, culture and quality of life.

- Support available from investment agencies, other agencies and red tape.
- FDI trends, leading investors and testimonials.
- Sector-based information, presentations, research/annual reports and marketing brochures, all downloadable.
- Information on the wider region
- Latest news – sometimes available as e-bulletins.

The team was particularly pleased with the Ireland IDA website and the Singapore Economic Development Board websites for the wealth of well arranged information on FDI and technology park location in these countries and the incentives and other features available. Among the technology park websites, the team particularly liked the Research Triangle Park and Multimedia Super Corridor websites.

Finally, indirect marketing is also done with the help of government agencies such as local cities, economic development authorities and local chamber of commerce.

8.4 Pricing

Since technology parks provide a bundle of services to their tenant firm clients[4], it is this bundle of services that must be priced for obtaining the revenues necessary for operating the park in a quality-oriented and responsive manner. The following are some of the key functions that must be paid for in order to provide the services necessary for attracting and retaining tenant firms in the park:

- Promoting the technology park and identifying and securing the tenant companies;
- Providing for all the all important links between tenant companies and universities, research and development facilities and industrial enterprises;
- Assisting young and start-up high technology companies with business plans and problems as they arise;
- Management of the land and buildings on the estate;
- Operating and providing services in the park;
- Planning the park and its strategy and making investment decisions;
- Paying for the management team and other employees with the park management company;
- Paying for the maintenance and upkeep of the facilities and environs of the park;
- Paying for the expansion and upgrading of the facilities in the park.

As mentioned in Chapter 7 above, there are four major models for funding technology parks. These are:

- **Model 1**: In this strategy, the state provides the initial investment and then lets the technology park meet all operating cost on a fee for service basis.
- **Model 2**: Both capital and operating costs are covered by the state as a social investment (100% publicly owned and operated).
- **Model 3**: The aim in this strategy is to structure the technology parks as a private, for profit real estate based undertaking (100% privately owned and operated).
- **Model 4**: This strategy is a hybrid one. The technology park is a public private partnership, whereby the state meets the capital and initial (3 to 5 years) operating costs on the basis that private investors will eventually take over the entity.

The extent and the nature of the pricing of park services becomes an important issue given the type of model adopted. Sapiens Parque has the choice of either Model 1, 2 or 4. This choice will decide to a large extent the pricing strategy to be employed by the park.

There are five basic methods to price (or more exactly, to recover revenue to cover investment and facilities operating costs of) park facilities and infrastructure[1]:

- Long term lease option
    - 50/99 years lease and option to renew
    - Stanford Research Park, USA
- Short term lease option
    - 5/10 years lease and option to renew
    - Research Triangle Park, North Carolina, USA
- Rental option
    - Month to Month
    - 1-2% equity partnership
    - San Jose Software Business Cluster
- Ownership and use
    - Hacienda Business Park
- Hybrid model
    - Lease/ownership and rental option

These options are briefly described below:

8.4.1 Long Term Lease Option

This type of model typically provides a 50 to 99 year lease option and provides an option to renew thereafter. Lease payments constitute the source of revenue for the park. This model is used by Stanford Research Park (SRP), USA. with great success. The management of SRP sees their control of the terms of the ground leases as being critical for the success of the park.

8.4.2 Short Term Lease Option

This model provides a 5 to 10 year lease options and provides an option to renew thereafter. This model is in use extensively by technology parks all over the world.

8.4.3 Rental Option

This option is typically in use at incubators like the San Jose Software Business Cluster in order to provide flexibility and pay-as-you-go capability to emerging companies in the incubator. In some cases, in return, companies are required to sign up for 1%-2% of their equity to these incubators' trust foundations. All technology parks and incubators have strict selection criteria for the tenants and make sure these new occupants act as good citizens for the community.

8.4.4 Ownership and Use Model

This type of model involves selling built up infrastructure to firms under the guidelines created by the technology park. But tenants participate with park management as owners and pick up the additional monthly cost of maintenance or other subsidized programs available through park management such as commuter program within the park, etc. Payments are made strictly on an ownership and use basis. Hacienda Park provides the best example of a park that uses this model.

8.4.5 Hybrid Model

This type of model is a mixture of lease or ownership and rental option for emerging businesses. It provides a good opportunity to attract large companies for achieving its goal of becoming an innovation hub. The Bishop Ranch Business Park provides a good example of this kind of park.

The type of facilities and investment return pricing model that Sapiens Parque uses will critically depend upon the type of ownership structure and payment structure of the park.

8.4.5.1 Service Charges

Once a technology park is operational, funding the running costs of the development needs to be considered. The usual arrangement is to create a service charge[5]. In the simplest case, this service charge has to pay for a range of annual revenue costs that include, for example, the maintenance of landscaping, sweeping and gritting roads and the upkeep of signs. It is usual that each of the occupiers contributes to this service charge and the way this is apportioned is normally set out in the contract for occupation, in the service charge schedule.

However, whether the cost of director or other staff should be included in the service charge is a matter for careful consideration when the park is being planned. If the park comprises a series of single occupier buildings that are on fully insuring and repairing leases, the number of services that have to be funded are fewer than where a park includes an incubator centre or other multiple occupier blocks in which cases the range of services will increase.

In addition to providing for the revenue costs associated with site maintenance there is a need to make provisions to cover long-term capital expenditure on buildings and infrastructure. It is useful to employ a building surveyor to predict these costs and set them out in a 25 to 40 year planned preventative maintenance and replacement program to help establish how much should be collected from each tenant as a contribution to a sinking fund through which to pay for this long term work. Creating sinking funds may include tax liabilities and will require careful documentation.

8.5 Place (Distribution)

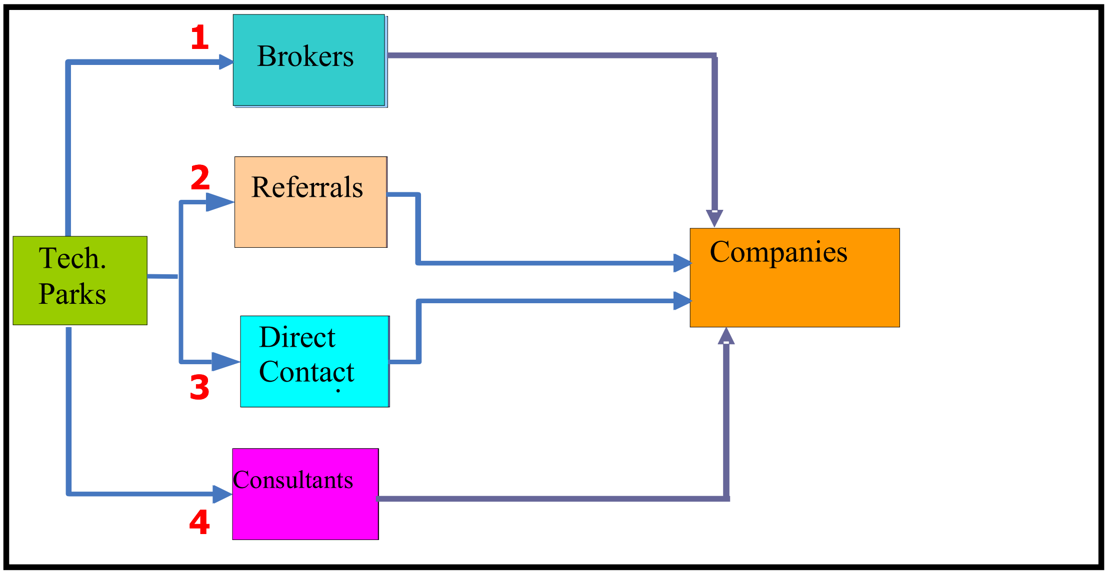
Since the services offered by a technology park are what prospective tenants are seeking, there is no distribution channel as such involved like there would be for a product-oriented industry or for a service industry like an airline. The line between promotion and distribution becomes very blurred in this case since the "distribution process" is initiated with the contact and promotion that is made with the prospective tenant and ends once the tenant makes the decision to locate in the park. Consequently, we will just elaborate on the principal channels of promotion/distribution that a typical technology park would employ.

As mentioned in an earlier section, the technology park industry is a highly relationship oriented industry. Many of the influencers in the decision making process in the sale or leasing are real estate agents or brokers[1]. The decisions on location selection by the customer are heavily influenced by brokers and the region's endowments. As a consequence, the channels of distribution are very much the same as those that are involved with the promotion of the park. There are many different channels available for promoting and "selling" the offerings of the park. These include (as discussed above under promotion):

- Brokers (Real estate agents specialized in commercial business)
- Referrals or network community
- Direct contact
- Consultants
- Chambers of Commerce
- Governments

The feedback from the expert interviews helped us evaluate the distribution/promotion for technology parks. Figure 8-4 below shows the four major types of "distribution" channel available to a technology park in practice.

Figure 8-4 Technology Park "Distribution" Channels



Source: GLOBUSTRAT Technology Park Study, 2006

8.6 Positioning of Technology Parks

The combination of the four marketing mix variables in implementation along with the relative image position that a technology park wants to create constitutes the positioning of the technology park. While this requires a full-scale analysis by itself given the imponderables that were identified in previous sections, we provide some guidelines in this section for Sapiens Parque based on our analysis of the positioning of some of the world's leading technology parks.

In order to understand how some of the world's leading technology parks position themselves we examined ten technology parks by collecting their sales collateral, evaluating their websites and scouring the secondary literature to understand how they were positioned. These ten leading technology parks included the following: Malaysia's Multimedia Super Corridor: Stanford Research Park, Research Triangle Park and Virginia Biotechnology Park in the US; National Science Park in Limerick, Ireland; Hsinchu Science Park in Taiwan; Hi-Tech City in Hyderabad, India; Cambridge Science Park in Cambridge, UK; Costa Rica Technology Park; Singapore Technology Park and the Aldershoff Business Park in Germany. We first evaluated these parks in terms of the following variables:

- Core objectives of parks
- Type of park
- Business climate
- Infrastructure
- Cost
- Human capital availability
- Access to market
- Proximity to universities

Then, in order to understand the positioning of these technology parks, we scored them on the 12 factors in our GLOINTECH model on the rationale that the relative position of these parks on the 12 "success" factors would provide us a means to understand their positioning. We used a 5 point scale to score each factor for each park where 1 implied a poor score and 5 an excellent score with the scores in between having a commensurate meaning. (2 = below average, 3 = average, 4 = above average), Table 8-4 below shows the comparative scores of the ten technology parks on the fifteen variables in the GLOINTECH model.

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Table 8-4 Comparative Scores of Ten Leading Technology Parks on GLOINTECH Factors

Park GLOINTECH Factors	Stanford Research Park, USA	Research Triangle Park, USA	Virginia Biotech, USA	Multimedia Super Corridor, Malaysia	National Science Park, Limerick, Ireland	Hitech City, India	Cambridge, Science Park., UK	Costa Rica Tech	Singapore Technology Park	Aldershof Park, Germany
Factor Conditions	5	5	4	3	4	4	3	3	5	4
Demand Conditions	5	5	3	2	2	4	3	3	5	4
Firm Strategy and Rivalry	5	5	3	3	3	4	3	3	5	4
Related and Supporting industries	5	5	2	2	2	4	3	2	5	5
Business and Political Climate	5	5	5	3	3	5	4	3	5	3
Existence of International industry networks	4	5	3	2	4	4	4	2	5	5
Clustering and Agglomeration Economics	4	5	1	1	1	2	4	2	5	5
Public Policy	4	4	5	4	5	4	4	3	5	3
Element of Chance	4	5	1	2	1	2	3	1	3	1
Innovation and Entrepreneurship	5	4	3	1	4	4	4	2	4	3
Anchor Effect	4	5	1	1	2	2	4	5	4	3
Path Dependency	4	4	3	2	3	1	3	2	4	2
Subtotal	**54**	**57**	**34**	**26**	**34**	**40**	**42**	**31**	**55**	**42**

Source: GLOBUSTRAT Technology Park Study, 2006.

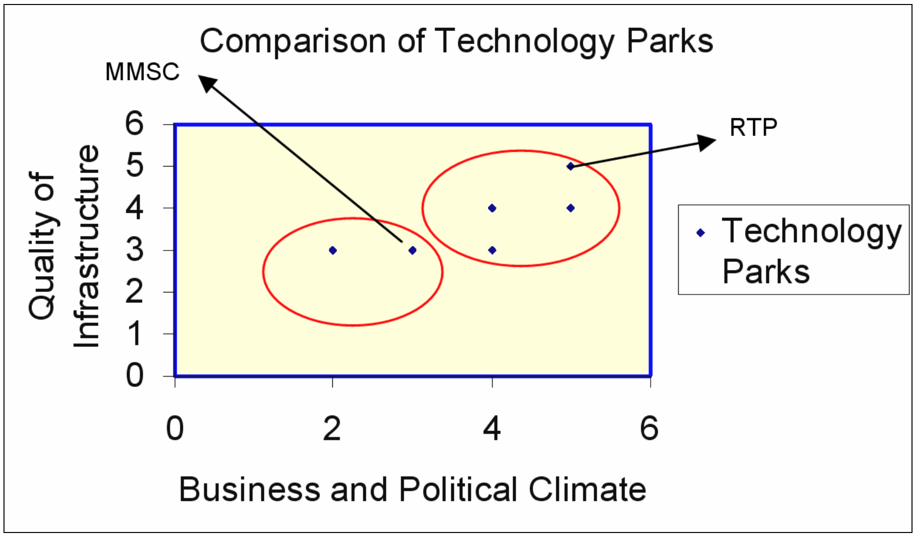
This scoring was based purely on our subjective analysis of our secondary research of these technology parks (as reflected in our park profiles in Appendix 1) and the analysis of collateral, websites and other secondary information. To analyze the relative positioning of these technology parks, we created pair-wise comparisons of factors on a two axis diagram. Table 8-5 below shows our comparison of technology parks for the business climate and quality of infrastructure variables while Figure 8-5 captures their relative positioning.

Table 8-5 Comparative Scores of Selected Technology Parks - Business Climate and Quality of Infrastructure

Name of Technology Park	Business and political climate	Quality of Infrastructure
Stanford Research Park,USA	5	5
Research Triangle Park,USA	5	5
Virginia Biotechnology,USA	5	4
MMSC, Malaysia	3	3
Limerick, Ireland	5	5
Hitech city, Hyderabad, India	4	4
Cambridge, UK	4	4
Costa Rica	5	4
Singapore Technology Park	4	3
Adlershof, Germany	2	3

Source: GLOBUSTRAT Technology Park Study, 2006

Figure 8-5 Comparative Positioning of Technology Parks – Business Climate vs. Infrastructure (Example)



Source: GLOBUSTRAT Technology Park Study, 2006

To analyze relative positioning of technology parks, we created pair-wise comparisons of following factors on a two axis diagram. Table 8-6 and Table 8-7 below show comparison of technology parks for the business climate, supporting industries, quality of infrastructure and anchor effect variables.

- Business climate and supporting industries
- Quality of infrastructure and Anchor effect

Examples of supporting industries include the following types of services and organizations. Appendix 5 includes a representative list of firms for each of these industries:

- National and international accounting firms
- Human resource firms
- Head hunter firms
- International and national law firms
- International finance specialists
- International trade and finance firms
- National and international logistics and transportation firms
- National and international patent, trademark and copyright specialist firms

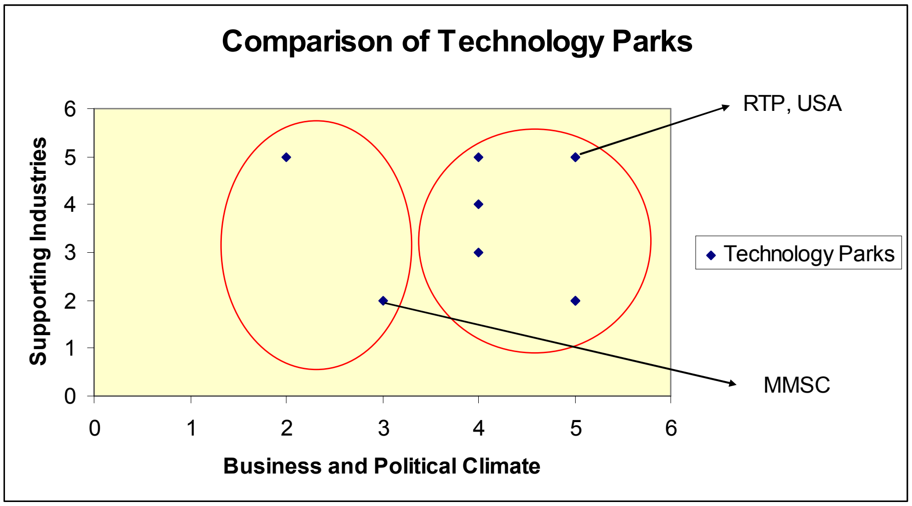
- National and international consulting firms particularly in marketing, technology, entertainment, sports etc.
- Temporary staffing firms.
- Relocation specialists
- Technology transfer specialists.
- Personal services firms.

Table 8-6 Comparative Scores of Selected Technology Parks – Business Climate vs. Supporting Industries

Name of Technology Park	**Business and Political Climate**	**Supporting Industries**
Stanford Research Park,USA	5	5
Research Triangle Park,USA	5	5
Virginia Biotechnology,USA	5	2
MMSC, Malaysia	3	2
Limerick, Ireland	5	2
Hitech city, Hyderabad, India	4	4
Cambridge, UK	4	3
Costa Rica	5	2
Singapore Technology Park	4	5
Adlershof, Germany	2	5

Source: GLOBUSTRAT Technology Park Study, 2006

Figure 8-6 Comparative Positioning of Technology Parks - Business Climate vs. Supporting Industries



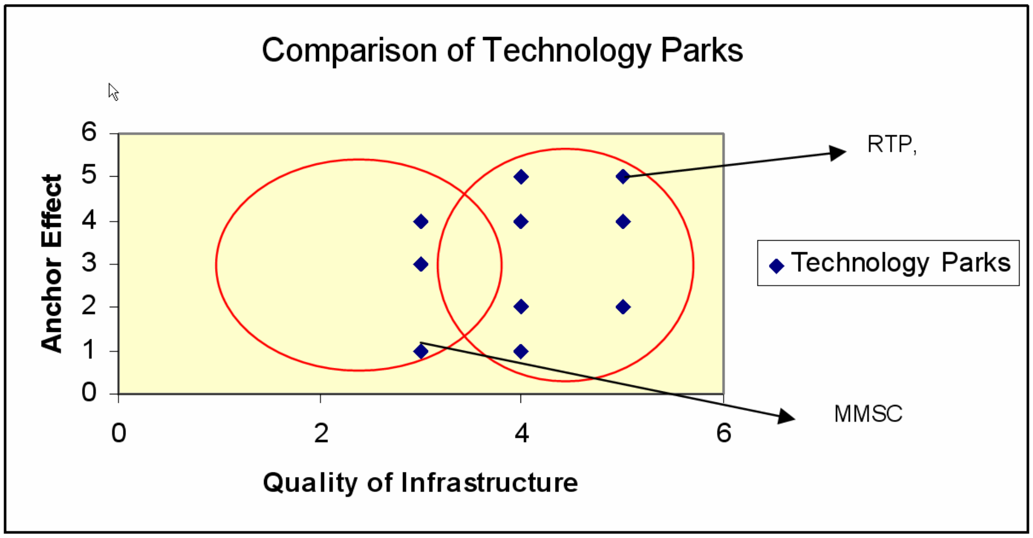
Source: GLOBUSTRAT Technology Park Study, 2006

Table 8-7 Comparative Scores of Selected Technology Parks - Infrastructure vs. Anchor Effect

Name of Technology Park	Quality of Infrastructure	Anchor Effect
Stanford Research Park,USA	5	4
Research Triangle Park,USA	5	5
Virginia Biotechnology,USA	4	1
MMSC, Malaysia	3	1
Limerick, Ireland	5	2
Hitech city, Hyderabad, India	4	2
Cambridge, UK	4	4
Costa Rica	4	5
Singapore Technology Park	3	4
Adlershof, Germany	3	3

Source: GLOBUSTRAT Technology Park Study, 2006

Figure 8-7 Comparative Positioning of Technology Parks - Business Climate vs.Anchor Effect



Source: GLOBUSTRAT Technology Park Study, 2006

As seen in Figure 8-6 and Figure 8-7 above, they capture the relative positioning of technology parks. These figures help us analyze *"How successful technology parks are positioning themselves."* As we have seen in Figure 8-5, Figure 8-6 and Figure 8-7 RTP, North Carolina, USA compared to MMSC, Malaysia is positioning itself much better in terms of quality of infrastructure, business climate and anchor effect factor. All of these factors are helping RTP, USA significantly to position RTP as one of the attractive technology parks in the eastern part of USA to prospective companies.

8.7 Direct Selling Efforts of Sapiens Parque

As mentioned in the above sections, direct contact with prospective tenants and anchor firms is an important element of marketing technology parks. In the summer of 2005, the GLOBUSTRAT team facilitated meetings between Sapiens Parque management, the Governor of Santa Catarina, and the following premier Silicon Valley organizations:

- **INTEL Corporation**
  - Charles S. Pawlak
    - Director, Corporate Real Estate Site Development
    - Intel Corporation, Chandler, AZ
  - Howard I High
    - Chief Technology Relations Manager
    - Intel Corporation, Santa Clara, CA

- **International Business Machines (IBM)**
  - Jeanette Horan
    - Vice President, Worldwide Information Management Development
    - General Manager, Silicon Valley Laboratories
    - IBM Corporation, San Jose, CA

  - Nelson Mattos
    - Vice President, Corporate Development
    - IBM Corporation, San Jose, CA
  - Andrew Clark
    - Director, Strategy/Market Intelligence, Venture Capital Group
    - IBM Corporation, Menlo Park, CA
  - Atul Chadha
    - Manager, Information Integration Technology Solutions, IBM Software Group
    - IBM Corporation, San Jose, CA

- **SUN MICROSYSTEMS**
  - Keith Tabacek
    - Director. Strategic Planning Workplace Resources
    - SUN Microsystems, Santa Clara, CA
  - Allison Baker
    - Senior Strategist, Global Product Engineering, HR Strategy and Planning
    - SUN Microsystems, Newark, CA
  - Stephen J. Huff
    - Manager, Global Government Strategic Sales
    - SUN Microsystems, Menlo Park, CA
  - Kleber Moraes
    - General manager
    - SUN Microsystems, Sao Paulo, Brazil
  - Paulo Mazluf
    - Manager
    - SUN Microsystems, Sao Paulo, Brazil
  - Pepi Edlinger
    - SUN I-Force Development Center Manager
    - SUN Microsystems, Menlo Park, CA

- **SYBASE**
    - Marty Beard
        - Senior Vice President, Corporate Development and Marketing
        - Sybase, Dublin, CA
    - Mark Westover
        - Vice President, Corporate Development
        - Sybase, Dublin, CA
    - Fabio Azevedo
        - Professional Services Director – LAO
        - Sybase, Sao Paulo, Brazil

- **CISCO Systems**
    - Scott Dierks
        - Worldwide Director, CISCO Education and Academy Programs
        - CISCO Systems, San Jose, CA
    - Steve Campbell
        - Manager, Executive Briefing Center
        - CISCO Systems, San Jose, CA

The facilitation efforts were accomplished successfully. Sapiens Parque management was able to sign a Memorandum of Understanding (MOU) with Sun Microsystems An MOU with IBM Corporation is in progress. We have also provided additional contact information of companies and investors in Appendix 3 of this report.

8.8 Summary

This chapter provided an overview of the marketing mix elements that are used by selected technology parks worldwide. It outlined the elements of marketing strategy that a park like the Sapiens Parque can use to market itself. It also presented the results of survey questions on desired park services and park promotion practices that were asked of technology park managers and park tenants around the world. The objectives of the questions was to provide Sapiens Parque management with clear guidelines on how to promote the park and how to match the criteria that managers use to choose a park location. The chapter also outlined an approach to positioning Sapiens Parque. Finally, it addressed our assistance with the direct selling efforts of Sapiens Parque management.

The next chapter looks at Santa Catarina's endowments in order to develop the recommendations that the Sapiens Parque should adopt in order to be successful in a highly competitive global technology park environment.

8.9 Sources – Chapter 8

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[1] Data collected from RTP website (http://www.rtp.org)

[2] A framework for FDI promotion by Henry Loewendahl

[3] Sales Collateral material of technology parks

[4] UKSPA 2003 Report

[5] The planning, development and operation of science parks by Malcolm parry and Peter Russell

Chapter

9

9.0 An Assessment of Brazil and Santa Catarina's Endowments

9.1 Introduction

This chapter provides an assessment of Brazil and Santa Catarina's resources and endowments. We compared these endowments to the 15 factors in our GLOINTECH model. The objective is to understand the capabilities of Brazil and Santa Catarina, identify endowment gaps, and develop recommendations that would enable the Sapiens Parque management team to meet its objectives, within its endowment constraints. In addition, such an assessment would highlight improvements and investments that have to be made by the Santa Catarina government to make the Sapiens Parque a magnet for global technology and investment.

First, we provide a broad ranging assessment of Brazil's and Santa Catarina's general endowments in terms of their general impact on the attractiveness of Sapiens Parque. We then conduct a comparative analysis of the top nine technology parks on the 15 factors in the "extended" GLOINTECH model. We explain our scoring scheme and then proceed to apply it to the nine technology parks that are likely to be competitive with the future Sapiens Parque. The scoring scheme is entirely subjective and is based on the judgment of the team members, as a result of their research and analysis of these parks, using the park profiles, Internet research and assessments by other experts. Notional scores to a future Sapiens Parque -like park are also provided in order to benchmark the future park (with the parameters described by the Sapiens Parque team) on the basis of the assessment in the first section and the information that the team could obtain from Sapiens Parque management, secondary sources and the Internet.

9.2 Brazil and Santa Catarina's Endowments

This section presents a broad-ranging assessment of the endowments of Brazil and Santa Catarina. The areas covered include locational geography, culture, government and the economy. An overall assessment of these factors is then provided.

9.2.1 Brazil

Brazil is the fourth largest nation in the world in terms of land mass and the sixth largest in terms of population. Some of the highlights of the country of Brazil, pertinent to this study, are:

- The most advanced technological nation in Latin America accounting for 70% of South America's GDP
- The only country in Latin America with its own satellite manufacturing and launching program (multiple satellites launched)
- Second largest depository of structural genomics research in the world
- Third largest manufacturer of aircraft (3610 planes delivered to 50 countries) and electrical motors in the world (Santa Catarina State)
- Fifth largest manufacturer of steel in the world
- Brazil has over 1,280 higher education institutions and R&D centers
- One of the world's largest communities of over 70,000 Java Engineers developing applications for medical, telecommunications, financial and government services for leading international firms
- Brazil has over 18,000 systems engineers and the largest JUG (Java Users Group) in the world

Thus, Brazil can be seen to have substantial assets in terms of skilled labor, advanced technology, large engineering and industrial base, world-class institutions of higher education and world-leading industries. This allows Brazil to be ranked in the company of countries like China and India in terms of its (yet unexploited) development potential.

9.2.2 Santa Catarina

This section provides a detailed assessment of Santa Catarina's competitive advantages and disadvantages.

9.2.2.1 Locational Geography

Santa Catarina is located in southern Brazil between Rio Grande do Sul and Parana. Geographically, Santa Catarina is flanked by the Atlantic Ocean on the east, prairies on the west and forests in the north and south. In the center of the state it is covered with beautiful Brazilian Pine. Santa Catarina typically gets very good weather throughout the year although it is the coldest region in Brazil and is the only state that gets snow cover. Santa Catarina's natural geographic endowments allow them to reap huge revenues from tourism. Beaches, coastlines, forests and great prairies, provide beautiful scenery and environment to Santa Catarina's residents. Florianopolis is one of the leading tourist resort destinations in South America.

Santa Catarina's location is central to the continent of South America. Situated in the Southern part of Brazil, the state lies near the borders of Argentina, Uruguay and Paraguay and is a short plane ride from the dynamic markets of Chile. Situated on the Eastern side of the South American continent, the State has a number of deep water ports and is a relatively reachable distance by ship from the Eastern seaboard and population conurbations on the East Coast of the United States. The state is also well connected internationally by air, with its airports a short 1 hour plane ride from Sao Paulo.

9.2.2.2 Culture

With a population of more than 5 million people, Santa Catarina has a very large European influence and is considered the most European state in Brazil. Through its rich history, European settlement by Portuguese, Russians, Germans, Italians and Polish settlers made Santa Catarina's culture very diverse. In addition to the European influences, there are other cultural influences such as Japanese and Arabian. One of the biggest annual events that occur in the state of Santa Catarina is "Oktoberfest". The largest beer festival outside of Germany, "Oktoberfest" occurs in Blumenau every year. Blumenau is a community with a rich German influence.

The cosmopolitan culture of Santa Catarina (especially Florianopolis) and the multi-cultural European and Asian influence makes the state attractive in terms of a short cultural distance from North America. While the relatively under-represented English skills may pose a problem even this situation is fast changing as larger numbers of the workforce of Santa Catarina learn English. World class European-based quality standards make the work ethic and cultural norms very conducive to high productivity work. Florianopolis, in particular has the highest proportion of skilled workers who speak English and is the location of some exceptional cultural assets in terms of entertainment, food and shopping. The European-based and cosmopolitan culture is also a great asset for world businesses to locate in this region given the proximity of the major Latin American markets.

9.2.2.3 Government

Brazil's government is a Federative Republic with an Executive, Legislative and Judicial branch. The current President of Brazil is Luiz Inacio Lula da Silva. Today Santa Catarina is governed by Governor Luiz Henrique de Silveira. The capital of Santa Catarina is Florianopolis and the largest city is Joinville. Santa Catarina enjoys having one of the highest standards of living in Brazil. It is a major agricultural and industrial center for Brazil. Santa Catarina makes up a large portion of Brazil's economic strength. Government is very supportive of business. They support business through government funding through grants, tax incentives and openness to Foreign Direct Investments (FDI).

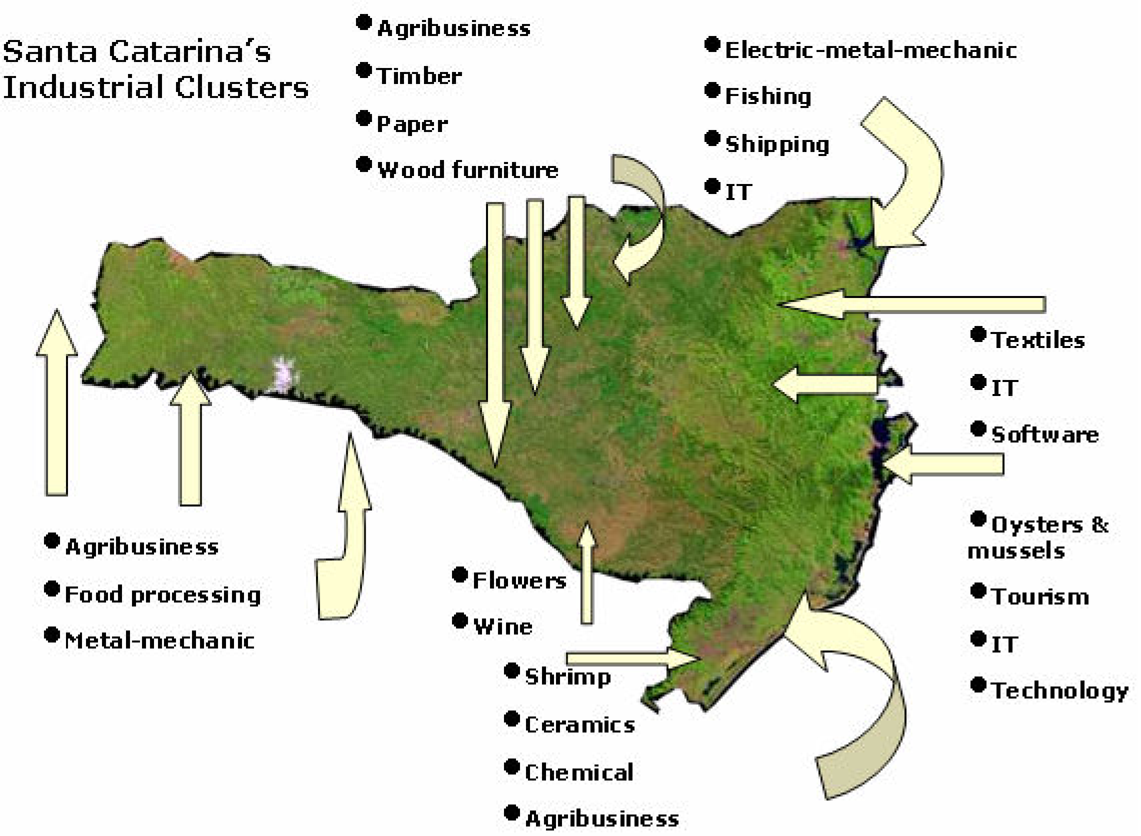
However, Brazil's government and the state is known to be bureaucratic and regulatory so that it takes much time and expense for a foreign company to get a business licence, approvals various types of inputs takes much longer than in India, Argentina or Chile.

9.2.2.4 Economy

Brazil's economy outweighs that of all other South American countries. Santa Catarina is one of Brazil's most prosperous states. Santa Catarina is home to the largest refrigeration equipment manufacturer in the world. In addition Santa Catarina also has industries such as, Technology, Metal Fabrication, Agriculture, Textiles, Tourism, Fishing, Electro-Mechanical and Ceramics, which are grouped into a series of large and vibrant industrial clusters. Figure 9-1 shows these clusters and their location in the state.

Santa Catarina is the most developed region of Brazil outside Sao Paulo in terms of per capita income, infrastructure and social development. In addition, while Brazil has a Corruption Perception Index of 3.9, Santa Catarina has the lowest crime rate in Brazil. Santa Catarina has also seen a phenomenal increase in job opportunities throughout the state. The employment growth in Santa Catarina has steadily increased each year. Santa Catarina's economy has grown steadily for the last five years. Santa Catarina's natural resources provide the state with a rich timber environment, a stable fishing industry, and temperate weather that is conducive to tourism, wine, and farming.

Figure 9-1 Santa Catarina's Industrial Clusters



Source: Sapiens Parque Presentation, 2005

Figure 9-2 shows the GDP and GDP per capita of Santa Catarina state as compared to Brazil as a whole. It can be seen that Santa Catarina has a GDP per capita which is higher than that of Brazil and has the second-highest GDP per capita among the states in Brazil (just behind the mega region of Greater Sao Paulo.

Figure 9-2 GDP and GDP Per Capita Of Brazil and Santa Catarina

BRAZIL/STATE	GROSS NATIONAL PRODUCT (R$ million)		GROSS NATIONAL PRODUCT PER CAPITA (R$)	
	2000	2001	2000	2001
Brazil	1.101.255	1.198.736	6.473	6.954
Santa Catarina	42.428	46.535	7.902	8.541

SOURCE: *IBGE Foundation and SDE/SC/DEGE/ Statistics Information Management*

Figure 9-3 shows the Human Development Index (HDI) for Brazil as compared to Santa Catarina. It can be seen that Santa Catarina ranks above Brazil on this index and is the second-highest ranked region in the country.

Figure 9-3 Human Development Index of Brazil and Santa Catarina

COUNTRY/STATE	HDI - Human Development Index		RELATIVE POSITION	
	1991	2000	1991	2000
Brazil	0,70	0,77		
Santa Catarina	0,75	0,82	5º	2º

SOURCE: *PNUD: Atlases of the Human Development*

Figure 9-4 shows the comparative GDP of Florianopolis near where the Sapiens Parque will be located. The data shows that Florianopolis has an income one-third higher than Santa Catarina and two times as high as that of Brazil. Thus, its standard of living is much higher than in Brazil and the state.

Figure 9-4 GDP per capita of Florianopolis Compared to Brazil and SC

YEAR	Florianópolis*	Santa Catarina**	Brazil***
1991	7.632	3.062	5.595
1992	7.323	2.944	5.480
1993	5.567	2.244	5.664
1994	6.567	2.692	5.909
1995	11.907	4.893	6.072
1996	15.200	6.025	6.148
1997	14.524	6.210 (2)	5.327 (2)
1998	13.878	6.446 (2)	9.192 (2)
1999	13.260	6.806 (2)	6.160 (2)
2000	12.292	7.902 (2)	6.386 (2)
2001		8.541 (2)	6.954 (2)
2002			7.707 (2)

Source: *Seduma/Gaplan **Bacen ***SDE (1) Estimative Seduma (2) IBGE

The major features of the state can be summarized in terms of the following data (2005):

- Multicultural Santa Catarina
- Official Language: Portuguese

- State Area: 95,346 km^2
- Population (78% urban): 6 million
- Literacy rate: 93.7%
- Life expectancy: 74
- GDP: US$ 16 billion
- Human Development Index: Highest in Brazil - 0.822
- Annual Industrial Growth: 4%
- Exports: US$ 3.2 billion
- Imports: US$ 2.2 billion

The features of Florianopolis are can be summarized as follows:

- Most developed region of Brazil outside Sao Paulo in terms of per capita income, infrastructure and social development
- Highest quality technical/science education region in Brazil
    - 16 universities with 5 technical universities with 20 degree programs in engineering
    - Federal University of Santa Catarina (UFSC) is a Top 5 university in technology and engineering in Brazil
    - 2000 Ph.D's in UFSC with 1000 in science/engineering
    - 1200 undergrads and 800 grads a year in engineering (mostly English speakers)
    - 450 ICT technicians a year
- 350 technology companies in Florianópolis, over 2000 in state

- Park ALFA - #1 high-tech incubator and technology park in Brazil
    - Biggest incubator in start-ups revenues and biggest tech park in number of companies and revenues
- Florianopolis, the capital of Santa Catarina, has been rated Top 5 city in technology growth
- Rated Best Capital City in quality of life in Brazil

The comparative advantages of Florianopolis in terms of infrastructure can be summarized as follows:

- Developed infrastructure
- International airport – 50' from Sao Paulo, 2h from Rio, 2h from Buenos Aires
- Telecommunication services
    - Telephone average cost of call to US (US$ per 4 minutes)
    - Telephone main lines (400 per 1,000 people)
    - Mobile phones (600 per 1,000 people)
    - Passenger cars (500 per 1,000 people)
    - Internet use rates (40%)
    - High-speed internet connections (20%)
    - R&D expenditure (2% of GNP)
- Vibrant business start ups (2000 per year)
- Lowest rate of crime in Brazil
- Human Capital Availability
    - Literate labor force (98% of total)

- High-school educated labor force (60% of total)
- College-educated labor force (12% of total)
- Scientists and engineers labor force (3% of total)

9.3 Evaluation

Based on this data and other extensive data collected, an evaluation of Santa Catarina and Florianopolis by the GLOBUSTRAT research team, as the site for a technology park, based on the 15 factors identified in our model, resulted in the following scores (on a 5 point scale ranging from 1 = poor, 2 = below average, 3 = average, 4 = above average and 5 = excellent) when compared to other similar regions in the world with technology parks: These results are summarized in Figure 9-5 below:

Figure 9-5 Scoring of Santa Catarina/Florianopolis Region on 15 Factors

S. No.	Factor	Score
1.	Availability of labor	4.0
2	Availability of capital	2.5
3	Availability of infrastructure	3.5
4.	Presence of market demand	3.0
5.	Regional presence of competitors & collaborators	2.0
6.	Presence of supplier and related industries	2.5
7.	Favorable business climate	3.0
8.	Favorable socio-political climate	3.0
9.	Existence of inter-firm linkages/connections	2.0
10.	High concentration of firms	3.0
11.	Favorable government policy	2.5
12.	Element of chance	3.0
13.	Presence of local innovation & entrepreneurship	4.0
14.	Existence of leading & anchor firms	3.5
15.	Presence of historical factors	4
	Total	45.5/75 Average Score = 3.03

It can be seen from the figure that Santa Catarina scores high on the availability of labor, presence of local innovation and entrepreneurship and the presence of historical factors with average scores on most of the items and below average scores on five factors. The total score of 45 puts the region as slightly above average in terms of its total score.

The following section provides a comparative analysis of nine regions worldwide which were home to successful technology parks, which we studied in detail. Based on our comprehensive review, we identified the key success factors that explain high-tech technology park success. Most of the nine technology park regions (clusters) we researched were considered to be highly successful in their home country.

The GLOBUSTRAT Consulting Group considered the following regions for comparison with the Santa Catarina/Florianopolis region as shown in Figure 9-6 below:

Figure 9-6 High Technology Regions Chosen for Comparative Analysis

No.	**Region**	**Country**
1	Silicon Valley	USA
2	RTP	USA
3	Ottawa	Canada
4	Limerick	Ireland
5	NRW	Germany
6	Cambridge	UK
7	MSC	Malaysia
8	Singapore	Singapore
9	Hsinchu	Taiwan

After a comprehensive review of the information available, each region was scored by team members based on the 15 GLOINTECH factors and the same 5-point scale that was used in the previous section. The outcome of this exercise was to obtain a comparative scoring of each region in terms of their relative endowment of the fifteen factors researched in this study by the research team.

9.4 Methodology for the Comparison Process

Based on the GLOINTECH model, we compared each region with each of our 15 factors. The results of the comparison formed the basis for our comprehensive ranking of the 9 technology park/cluster regions discussed in this chapter.

The GLOBUSTRAT team compared each of the regions for each indicator on a scale of 1 to 5, 1 meaning poor on the factor, 2 meaning below average, 3 meaning average, 4 meaning above average and 5 meaning excellent (just as we had done in the case of the Santa Catarina/Florianopolis region above). Since most of these regions were considered to be the home of successful technology parks/clusters, the ranking for many factors tended to be high. The comparison involved scoring the regions relative to each other on each indicator. The complete list of factors was defined in Chapter 3, when we explained the GLOINTECH Technology Park Model. The GLOBUSTRAT team went through an interactive and iterative process where regions were scored by the team. Scores were adjusted until the team achieved convergent estimates. This process is similar to a methodology based on expert opinion to obtain convergent rankings for indicators of which some or many of which may be subjective.

The next step consisted of calculating averages for each indicator and to calculate a composite value for each of the 15 factors (using the values for the indicators that constitute that factor) and each of the 9 technology park/cluster regions. Those results are presented below in Figure 9-7.

It can be seen from the Figure 9-7 that the Stanford Research Park region was the highest-scored park, with a mean score of 4.58, followed by the Research Triangle Park region with a mean score of 4.11. These two leaders are in turn followed by the region of Singapore, the Limerick region and Taiwan (with scores of 4.04, 3.72 and 3.89 respectively). The worst performers from the bottom up are the Multimedia Super Corridor in Malaysia and the Nordheim-Westfallen region in Germany. The other results can be read off directly from Figure 9-7 below. It can also be seen by comparing these results with those in Figure 9-5 for the Florianopolis and Santa Catarina region. It can be seen that that there is considerable scope for improvement for the Government of Santa Catarina in terms of those variables which have low scores in Figure 9-5 above.

Figure 9-7 Relative Score of High Tech Regions on 15 GLOINTECH Factors

Cluster	Silicon Valley	RTP Region	Ottawa	Limerick	NRW	Cambridge	MSC	Singapore	Hsinchu	Average
Country	USA	USA	Canada	Ireland	Germany	UK	Malaysia	Singapore	Taiwan	
Availability of Labor	4.5	4.3	3.5	4.0	4.0	4.0	3.0	4.3	4.3	3.99
Availability of Capital	4.2	4.0	4.0	3.6	3.0	4.0	3.0	3.8	4.0	3.73
Availability of Infrastructure	4.4	4.4	4.6	4.4	4.2	4.4	3.8	4.4	4.2	4.31
Relate/Supporting Industries	5.0	4.7	3.7	4.0	3.7	4.0	3.5	4.0	4.0	34.06
Anchor Firms	5.0	4.7	3.0	4.0	3.0	4.0	3.5	4.0	4.0	3.91
Element of Chance	5.0	4.7	3.0	3.7	3.7	3.5	2.3	3.7	3.3	3.66
Market Demand	5.0	5.0	2.7	3.3	3.7	4.0	3.7	4.5	4.5	4.04
Firm Concentration	5.0	4.3	3.0	3.7	3.0	3.5	3.7	4.0	4.0	3.8
Industry Networks	3.4	3.4	3.4	3.6	4.0	3.4	3.6	4.4	3.4	3.62
Competitor Presence	5.0	4.3	3.0	3.7	3.7	4.0	4.0	4.0	4.0	3.97
Public Policy	3.6	3.6	3.9	3.9	3.6	3.5	3.4	4.3	4.0	4.16
Socio-Politic Climate	4.8	4.8	4.3	4.3	3.3	4.2	3.5	4.0	3.8	4.11
Business Climate	5.0	4.0	2.6	3.4	2.8	4.0	3.6	5.0	3.4	3.76
Innovation and Entrepreneurship	5.0	4.3	3.2	3.7	3.3	4.0	2.7	3.2	4.0	3.94
Historical Factors	3.8	3.5	2.3	2.5	2.5	3.5	2.5	3.0	3.5	3.01
Average of all factors	**4.58**	**4.11**	**3.34**	**3.72**	**3.43**	**3.37**	**3.32**	**4.04**	**3.69**	

Another way to present these results is to compare for each region those factors on which it scores highest (see Figure 9-7). Here within each region, we offer yellow highlighted entries that indicate that this factor scored higher than average for that cluster (the column average). The high ranking for Silicon Valley and the RTP region is very obvious: these regions scored higher than average on most factors. To a lesser extent, the same finding holds for Singapore, Limerick and Hsinchu.

Figure 9-8 shows the following results were obtained for the top regions:

Figure 9-8 Scores of Key Regions

	Regions	**Scores**
1	Silicon Valley	4.58
2	RTP	4.11
3	Singapore	4.04
4	Limerick	3.72
5	Hsinchu	3.69
6	NRW Region	3.43
7	Cambridge	3.37
8	Ottawa	3.34
9	MSC	3.32
10	Florianopolis, SC	3.03

The key factors that emerged from this comparison reveal that the factors that ranked high are those that are already prevalent in these regions. Florianopolis/Santa Catarina ranks the lowest with the lowest composite score. There is considerable opportunity for improvement and by looking up Figure 9-5 and seeing the factors in which the region scores low, Sapiens Parque management and the Government of Santa Catarina can systematically move towards improving the scores for the region so as to attract substantial FDI and high technology activity to the area.

9.5 Summary

In this chapter, we undertook a major effort to score each leading high tech region on 15 factors, which were further represented by 73 indicators. This allowed us to conduct a comprehensive comparison of high tech regions worldwide. The results of this analysis showed the relative ranking of Florianopolis/Santa Catarina was the lowest even though it was well endowed with the advantages of locational geography, a user-friendly culture, steady growth and a relatively sound economic environment. We also detailed the endowments of Brazil, Santa Catarina and Florianopolis before doing this analysis.

The next chapter will provide the recommendations and conclusions that will emerge from our study.

Chapter 10

10.0 Conclusions and Recommendations

10.1 Overview

This chapter details the major conclusions and recommendations of our 13 –month study of the global technology park industry. We first summarize our conclusions in terms of our top four dimensions that emerged from the survey responses based on our 12-factor analytical model of technology park success. We then present our detailed conclusions in terms of the key research objectives that were identified for this study.

Our extensive secondary research and review of the literature helped us to identify the key variables that needed to be included in our comprehensive analytical model of technology park success. In addition, this extensive research enabled us to understand the best practices in technology park development and management and practices that led to technology park success.

Our primary research survey identified the key factors that are essential for the success of a technology park. We used the data collected from the surveys of the park management and tenants to identify the KSFs. In our theoretical model, GLOINTECH, we had identified 12 factors that we believed were essential for the success of any technology park. Using regression analysis, we showed that all of the 12 factors presented in our theoretical model are important KSfs although their relative importance varies. Based on the results of the regression, the 12 factors were grouped around broader themes and then ranked according to relative importance. The top four dimensions that were found to be significant in explaining the success of parks in terms of their ranked relative importance were business environment, public policy and availability of labor, input prerequisites; co-opetition and market demand issues. We present our major conclusions in terms of these four major dimensions below.

10.2 Business Environment, Public Policy and Availability of Labor

Factor 1, Business Environment, Public Policy and Availability of Labor, is the first factor that was shown to have significance in the regression, and, of the four factors, this had the highest relative importance.

Business Climate and Socio-political Climate -The regional business environment consisting of the business climate and socio-political climate is one of the major factors that impacts the success or failure of technology parks. A positive business and socio-political climate that is based on the enforcement of private property right laws; local support of entrepreneurs and entrepreneurship; historical record of being business friendly; the existence of a climate for risk taking; political stability; a low level of crime and labor unrest; and a high quality of life is conducive for technology park success. In the European Union, due to the prevalence of government red tape for conducting business and the onerous nature of the labor laws, the business climate has not been favorable for technology parks. It should also be noted that the global technology slowdown has also transpired to create this unfavorable business climate in Europe. This common factor has been mitigated for technology parks in North America in spite of the global technology slowdown by the more favorable stance of the federal and local governments in the US and Canada with regard to streamlining the bureaucratic constraints facing high technology firms and the relatively more deregulated environment with respect to labor laws, entrepreneurship and protection of property rights.

Public Policy -The most important government policies for technology firms across the regions studied has been the protection of intellectual and private property, and the Research and Development (R&D) tax incentives to attract potential clients to the region. These have been critical success factors for technology parks. The EU and North American region generally do have these elements present and are striding toward providing more R&D tax credits for technology firms. In Asia, the governments in Taiwan, Singapore and Hong Kong are trying hard to improve and enforce intellectual property laws and have made good progress on this front. R&D tax incentives are also present in the Asian region. There are also grants or direct financial support of the technology firms in parks from local and state governments.

Availability of Labor- A skilled labor pool is a magnet for bringing industry to a technology park. The field experience in Hsinchu Science Park in Taiwan and Silicon Wadi in Israel supports the importance of this factor. In Hsinchu, from the establishment of the PC industry in the early 1980s, the skilled labor force in digital electronics was a key factor attracting and retaining high technology companies to the area. The main sources of highly skilled labor in the European Union are the research universities, and public and non-public research centers with close affiliation with regional research universities. The increased mobility of the highly skilled labor force in the EU has also contributed to meeting the skilled labor demand of technology firms across the region and has contributed to the success of the technology parks.

10.3 Input Prerequisites

Factor 4, Input Prerequisites, is the second dimension that exhibited significance in the regression, and, of the four factors, this had the second highest relative importance. It includes the availability of capital, the availability of infrastructure, and the existence of leading anchor firms.

Availability of Infrastructure- Good telecommunication and internet connectivity is an important factor for park success. This bandwidth requirements of the high technology industry generally extends to the availability of fiber optics networks. Parks also require reliable and abundant power supply. Given the global nature of business today, another important component of a technology park is proximity to transportation infrastructure, particularly airports and highways.

Availability of capital- While there are many sources of financing for tenant firms, each source of financing is "stage" specific to the firm. The financing that is appropriate for a startup firm will be different from the financing of a firm in the growth stage or a mature firm. Availability of venture capital has been noted as a particularly important source of financing for technology park firms given the nature of the industries represented in most technology parks. The availability of venture capital financing in any region is dependent on specific drivers. Globally, the levels and intensity of venture capital varies considerably. North America has the most developed venture capital industry, followed by Europe and Asia. In Latin America, venture capital is still in its infant stage of development. Interestingly, while venture capital is seen as an important form of financing for technology park firms, most firms in technology parks are financed by other sources of financing, in particular bank financing, government research funding and private equity.

Leading Anchor Firms-These are well-established companies interested in locating in or within close proximity to a technology park. It is highly desirable to have an anchor tenant located in and around technology parks as it helps promote the park as a desirable location for other supporting or competing firms. Leading firms also bring in their suppliers, complementors and customers thus boosting the growth of the park. For example, the success of the Stanford Research Park was initiated by the location of its first two anchor tenants, Varian Bothers and the Hewlett Packard Company. Similarly, the technology cluster in Costa Rica was anchored by Intel Corporation.

10.4 Park Specific Endowment Issue

Factor 2, Park-specific endowment issues, is the third dimension that showed significance in the regression, and, of the four factors, this was the third most significant dimension. It includes historical factors, existence of inter-firm linkages, high concentration of firms, the element of chance and the presence of local innovation and entrepreneurship.

Historical Factors – The historical factors variable consists of the historical presence of key firms in the region and the historical linkages between firms. European migration in the early to mid 1900's with linkages back to Europe, including connections to European universities led to the development of a highly skilled labor force. Many of the key industry clusters in Santa Catarina trace their success to this highly skilled labor force.

Existence of Inter-firm Linkages/ Connections- This factor consists of high level of inter- and intra-firm linkages; cross-border industry networks, existence of industry associations, collaboration between firms and universities and research institutions. In the case of Stanford Research park, RTP and Hsinchu, these embedded linkages have contributed considerably to the success of these parks. Florianopolis and Santa Catarina scored low on this variable in the endowment category as there are relatively few inter-firm linkages.

High Concentration of Firms- This includes a large number of firms and suppliers in the region; spillover effects; and the positive benefit of locating near other firms. The most successful parks like SRp, RTP, Hsinchu, Oulu Technology Park etc. Have benefited tremendously from such agglomeration effects. There are over 350 technology companies in Florianópolis and over 2000 in the state of Santa Catarina. Florianopolis, the capital, has been rated Top 5 city in technology growth in Brazil. All this augurs well for the Sapiens Parque on this count.

Element of Chance- This includes the reputation of a location; the roots of firm founders in the technology park region and pure chance. For example, Silicon Valley and Stanford Research Park may have never started if Frederick Terman, Professor of Electrical Engineering at Stanford University (who was credited with helping his students William Hewlett and Dave Packard start HP) had not contracted tuberculosis while at MIT requiring him to return to the more salubrious climate of the Bay Area.

Presence of Local Innovation and Entrepreneurship – This factor involves the following variables – presence of local entrepreneurial firms; availability of technologists and managers; patent and intellectual property activity in the region and the local presence of incubators. The success of the Finnish technology parks has been attributed to the existence of a large number of local entrepreneurs as was that of Hsinchu Science Park. Many companies in various industries started in Santa Catarina (i.e. Karsten, Marisol, Teka, WEG, Duas Rodas, Bretzke, etc.) and were the sources of local innovation and entrepreneurship.

10.5 Co-opetition and Market Demand Conditions

Factor 3, Co-opetition and Market Demand, is the fourth factor that demonstrated significance in the regression; however, of the four factors, this was the least significant. It includes the regional presence of competitors and collaborators (in other words, co-opetition); presence of suppliers and related industries and the presence of local market demand.

Regional presence of competitors/collaborators- This factor relates to the presence of local competitors, the proximity to complementary firms and the presence of leading firms. RTP and Route 128 are examples of technology parks/clusters where the presence of local competitors and the proximity of complementary firms resulted in park/cluster success. Santa Catarina has a thriving technology cluster. The State has 10,500 technology companies, which together amount to annual revenue of $700 million and employs 48,000 workers. Many of them are located in Blumenau, Florianpolis and Joinville. This thriving cluster is able to help each individual firm create important scale by taking advantage of the synergies offered by the other firms. The concentration of industry creates concentrations of factor inputs specific for the industry. This phenomenon has been seen in several of the clusters studies, including Silicon Valley, Silicon Wadi, Hschinshu,the Scandnavian cluster, etc.

Presence of Related and Supporting Industries: The presence of related and supporting industry includes the proximity to suppliers; presence of partner firms; the existence of legal, accounting, consulting and other supporting firms; and the presence of logistics firms. Many examples of such synergistic effects can be seen in technology parks like the Cambridge Science Park; the Irish Software Park etc. The existence of the legal and accounting firms in Florianopolis presents a significant advantage for firms in Sapiens Parque.

Market Demand Conditions: The presence of local markets, proximity to local buyers, growth rate of overall market and access to international markets. The advantage of favorable market demand conditions can be seen in Singapore, where the cluster has been fueled by the growth of the regional Asian economy and its international connection to Silicon Valley for hard disc drive industry growth. Santa Catarina, as a regional hub, has tremendous potential for growth being close to growing markets in both, neighboring states and MERCUSOR partner countries.

10.6 Recommendations

10.6.1 Industries to Target

Sapiens Parque's strategy of multi focus, multi purpose is a proven method to avoid risk , attract anchor firms from different segments and maximizing revenue potential. Sapiens Parque has indicated that these are the technologies that they would like to have in the park.

- Digital Entertainment
- Computer Hardware and Software
- Tourism-not related to core mission of park
- Sport Technology
- Nanotechnology
- Telecommunications
- Trade and investment related

In order to provide Sapiens Parque with an endowment based assessment of industries to target, we focused on three different categories of industries based on our secondary and primary research. The three categories of industries to target were based on:

- High growth and high demand industries (as identified by the Gartener Group)
- Target industries based on matching Santa Catarina's current endowments/ industrial profile with good existing demand
- Target industries based on matching Santa Catarina's endowment with industries that show promise for future demand growth. Figure 10-1 shows these industries

Figure 10-1 Industry Sectors.

High growth industries for the next 5 – 10 years	**Industry to focus based on current Endowments**	**Based on Endowment and future growth SP should focus on**
Computer services	Agribusiness	Software
Telecommunications	Food Tech & Processing	Food Technology
Nanotechnology	Electric, Electro-Mech and Electronic industries	Agribusiness
Alternative Entergy	Outsourcing	Alternative Energy Environment Sciences
	Aquaculture	Outsourcing
	Chemical	
	Ceramics	

In addition, in the list provided to us by Sapiens Parque, we find that the objective of having tourism and sports technology-related industries in the park to be challenging. This is because in our research we did not find a single case of technology park having tourism and sports as part of their park configuration. This does not mean that these industries are not viable but that it will be difficult for the Sapiens Parque management to develop a strategy to implement this vision.

Additionally, given the resource endowments and based on demand related considerations (expected strong demand growth), we identified industries where Sapiens Parque and the government of Santa Catarina would have to make substantial investments

- Bio-medical research, development and manufacturing
- Healthcare services
- Regional distribution

10.6.2 Park Financing

We recommend that Sapiens Parque adopt a demand based build-as-you-go and finance-as-you-go model, where the major investments are made as the demand for park facilities and services dictates. Based on our detailed analysis of park financing we recommend the following methods for Sapiens Parque :

- Bonds with State Guarantee
- Short-term lease, will be a preferred option but ability to attract client in the initial stages need to be weighed in.
- Ownership and use , depend on Sapiens Parque's vision can be used as a short or long term option.
- Government funding, most successfully utilized by Asian parks can be a major driver.

And we recommend that the ongoing operations can be funded by :

- Corporate Sponsorship, this is used successfully by number of parks in the areas of common interest such as maintaining ponds, planting trees, roads etc..
- User fees, charge per use or a temporary rental.
- Charged for services, can be used if the park adopts different level of services rather than a standard one .. eg. Fiber Optic vs Ethernet based networks.

10.6.3 Financing of Tenant Firms

As indicted in our secondary and primary research, availability of capital to firms is one of the most important factors in the success of the high technology parks. We recommend the following :

- Sapiens Parque should reach out to potential angel investors to create a network of angel investors. This network of angel investors should be facilitated and managed by Sapiens Parque and provide matching service between the tenant firms that require funding and the angel investors by industry.

- It should not restrict itself just to angel investors, it should also reach out to venture capitalists regionally and also internationally to create an effective network of venture capitalists. Firms can use this VC network to obtain financing and Sapiens Parque management can facilitate the matching between firms and VC's. Sapiens Parque, by utilizing the "Demand Pull" building model, generate a pool of capital to use as a fund of funds for local venture capital.

- Sapiens Parque should work with the local and regional banks and commercial institutions to have their representation on site to facilitate financing for firms. Our secondary research has indicated that firms have difficulty in obtaining bank loans. Sapiens Parque should work with banks to guarantee loans made to tenant firms and create linkages between bank and tenant firms

- The results of our survey have indicated that tenant firms use government R&D grants and loans as the primary source of funding. Sapiens Parque should work with INOVOR to facilitate the tenant firms in obtaining the R&D funds.

- Sapiens Parque to assist the tenant firms with management expertise, otherwise provided by VCs in taking the tenant firms to success.

- Sapiens Parque to reach out to executive volunteer services to provide counseling services for tenants. This can be found in United States (www. Score.org)

- Sapiens Parque to support Small Business Development Center (www.sba.gov/sbdc) style-resources for park tenants. SBDC models operate world-wide and generally provide intensive management training and consulting to support SMEs.

10.6.4 Management of the Park

'The park management is a critical factor not only in the initial stages but also on an ongoing basis. Our survey results have indicated that, on going park management is an important factor for the tenant firms to move in or to stay in the park.

The following are our recommendations with regard to park management:

- The variable costs of parks are typically passed on to tenants in the form of maintenance and other costs. Example of these costs are Common Area Maintenance (CAM) cost, parking structure maintenance cost, park management team costs etc.. Sapiens Parque should try to keep these costs under control and at a minimum level to help the tenants firms cost down and to make the park attractive.
- Work with authorities to make necessary changes in the regulations not to charge taxes on inputs and the import of equipment or raw materials etc. but instead charge taxes based on profits.
- We recommend that Sapiens Parque management consider the following to attract tenants to the park:
    - Enhance the attributes of the location of the park in terms of improving access to the location , upgrading infrastructure and improving environmental quality. As we know, Florianopolis is an attractive tourism location, working with a well-known advertising & promotion company will add more value to the attractiveness to Santa Catarina and Florianopolis.
    - Strengthen the Sapiens Parque management team by hiring experienced and qualified world-class technology park management professionals.
    - Work with local government in areas such as park promotion, including road shows, site visits in target industries and regions.
    - Focus on providing exceptional customer service through professional training and continuous service improvement programs.

  - Target the right mixture of tenants in terms of quality and nature of business.
  - Offer bundled services such as telecommunication, networking and power needs.
  - Create an environment friendly park through green energy efficient buildings and park surroundings that are environmentally state of the art.
  - Provide common office center for small and medium startup tenants.
  - Provide common labs for R&D activities of small and emerging companies.
  - Production oriented facilities – SP management should balance between R&D and production facilities to provide a dependable revenue stream and keep the costs for R&D based tenants lower. For example Stanford Research Park, RTP and Silicon Wadi target both type of tenants.

The following are the recommendations for retention of tenants:

- Higher standard in customer service, Eg. Provide 24 x 7 service with a one stop solution.
- Regular upgrading and maintenance of facilities.
- Work with various agencies to provide quality of life facilitators like affordable housing , healthcare , education options are available.

10.6.5 Marketing Mix Strategy

- Pricing
  - Keep price as low as you can go and still maintain profitability and consider profit based revenue model.
  - Tiered pricing scheme based on square feet acquisition by tenants.

- Promotion – Based on our findings SP management should implement an integrated promotion plan, which includes the following:

  - Differentiating eBusiness portal: Sapiens Parque should establish a differentiating eBusiness portal i.e. business decision tool to improve its brand image and build following features. This e-portal will help Sapiens Parque to differentiate itself from its regional competitors and provide easy access to information such as
    - Provision of multilingual options – German, Chinese, English, Korean, Spanish and Portuguese.
    - Facts, figure and general information about region.
    - Information tailored to targeted industry segments.
    - Downloadable marketing brochures, presentations, research, and annual reports.
    - Information about university and research and training facilities in the vicinity.
    - Property and site views through photographs, virtual tour and search functions.
    - Contact us feature including live chat.
- Distribution – Sapiens Parque management should develop strong relations with local or regional brokers and locational consulting firms to attract tenant firms.
- Join International Association of Science Park (IASP) and promote the Sapiens Parque name.
- Road show or site visit - Sapiens Parque management should travel with Santa Catarina officials on road shows and site visits to major companies and cities.
- Sapiens Parque management should enhance their direct selling efforts by locating offices in proximity to customers and plan site visits to targeted industry segments mentioned in endowments recommendations.

- Sapiens Parque should host and attend targeted industry trade shows and invite industry leaders. Below are some examples of tradeshows and conferences.

    - CeBit (Biggest computer expo in the world)
    - Consumer Electronic show (COMDEX)
    - Java One Conference (Biggest Java user group conference)
    - Biotechnology industry conference (BIO-East)
    - Association of University Research Park Conferences (AURP)
    - International association of Science Parks Conferences (IASP)

- Improve sales collateral - Sapiens Parque sales collateral material to be used in direct sales offices & trade shows by including following things.

    - Facts and figures of the region (Highlight critical endowments related to targeted industries).
    - Technology park offerings (Infrastructure)
    - Targeted industry focused material
    - CDROM and DVD (packaged material)

10.6.6 Park Development Strategy

The Sapiens Parque management, in conjunction with the state government, should focus on the following recommendations for park development strategies.

10.6.6.1 Public Policy

Active role of government:

- Work with the government to streamline and implement fast track licensing eg.. single window clearance, same day approval etc..

- Government should establish public policies that will ensure protection of Intellectual Property (IP). TRIPS compliance.

- State government should provide favorable tax laws and incentives to business. This can be implemented in multiple ways, examples would be tax holidays, R & D write off's etc..

- State government should ensure the continual development of the state's road system, ports and airports. We suggest that Sapiens Parque management look at models in Asian countries by visiting this sites and partnering with private companies to promote infrastructure projects like airport, toll ways etc..

Supportive role of government:

- Government is the facilitator of park development.

- Government has a key role to play in the support of education training and human resource development.

    - Create scholarships to fund educational programs.

    - Introduce bilingual / multi lingual education with emphasis on English.

Areas government should avoid:

- Avoid setting up production-type operations thru government initiatives.

- If government intervenes to establish financing programs, should plan on privatization as quickly as possible

- Avoid conflicting policies between Federal government and local government.

10.7 Progress Made

One of the major objectives of Sapiens Parque management was to contact anchor firms during the March 2005 - 2006 timeframe. The GLOBUSTRAT consulting team short-listed and contacted some of the leading high technology firms in Silicon Valley in order to facilitate their working with the Government of Santa Catarina and Sapiens Parque management to become an anchor tenant. The GLOBUSTRAT team is pleased to note that five firms where in close contact with the Governor of the State of Santa Catarina and Sapiens Parque management to consummate such a relationship. The list of the firms and the status of progress is as follows:

- Sun Microsystems (MOU in place)
- IBM and Cisco Systems (MOU in progress)
- Intel Corporation
- Sybase

We hope that Sapiens Parque management team will quickly capitalize on the opportunity created by GLOBUSTRAT team to have these leading firms as anchor tenants in the park.

10.8 Summary

This chapter presented the major conclusions and detailed recommendations for Sapiens Parque management to act upon to successfully launch and manage the park. Our conclusions were presented in terms of four major dimensions of technology park success obtained from our global survey. Detailed recommendations were made in each of the major areas identified in the management and research objectives of this study. We believe that with the information provided in this study Sapiens Parque will be able to meet the following goals:

- Become a global magnet
- Achieve prominence as next-practice park
- Become a technology and business leader
- Build financial and product-market potential
- Self-finance growth – perpetual source of capital
- Promote and market Sapiens Park to sign up anchor tenants

Science and Technology Parks

Global Best Practices and Key Success Factors Report

APPENDICES

Prepared for the
Government of Santa Catarina
State, Brazil
including the
Sapiens Parque Technology Park
Authority

GLOBUSTRAT Consulting Group
Transnational Executive MBA (TEMBA)
College of Business and Economics
California State University, East Bay
March 21, 2006

Appendix

1

A1 Technology Park Profiles

This appendix provides a detailed examination of selected science and technology parks worldwide.

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A1.1 North America

A1.1.1 Research Triangle Park, North Carolina, USA

1		PROFILE INFORMATION
Common Name of Technology Park		Research Triangle Park
Location		North Carolina
Phone		Phone: 919-549-8181
Email address		
Formal park Name		Research Triangle Park
Address Line 1		2 Hanes Drive • P.O. Box 12255
Address Line 2		RTP, NC U.S.A. 27709
Fax		919-549-8246
Primary Focus		Scientific research and development (Biotech, Nanotechnology, Software, Health Science, Material, Pharmaceutical, Telecom)
Principal Owner/Investor		Research Triangle Foundation, non-university entity
Background		Research Triangle Park (RTP) is a public/private, planned research park, created in 1959 by leaders from business, academia and industry. But the idea of creating a research park started many years before. Many people in the 1950s started thinking about the concept of a research park including Howard Odum, professor of sociology at the University of North Carolina at Chapel Hill. In 1952, Odum proposed several research center formats that incorporated the idea of cooperation among research organizations. Romeo Guest was another person who was extremely involved with the idea of forming a research park. Guest was one of the first people to use the phrase "Research Triangle Park."
Vision		A better life for all North Carolinians through sustainable knowledge and technology-based development that effectively balances human needs and humanities with economic opportunities
Mission		To promote university, academic, industry and government collaborations leading to the establishment and maintenance of research, scientific and technology-based facilities within the Triangle and North Carolina, creating quality jobs and opportunities for its citizens.

Location		This 7,000 acre R&D park is conveniently located near three major research universities: Duke University in Durham, North Carolina State University in Raleigh and University of North Carolina at Chapel Hill.
Facilities		Research Triangle Park is the perfect location to locate your research and development facility. This 7,000 acre R&D park is conveniently located near three major research universities: Duke University in Durham, North Carolina State University in Raleigh and University of North Carolina at Chapel Hill. We have an excellent quality of life in the Triangle, with lower housing costs, excellent educational system, a variety of dining, outdoor activities and entertainment and an excellent business climate. There are currently 1,100 acres in RTP that are still available for development. Size: • 7,000 total acres • 8 miles long, 2 miles wide
Services		**RDU International Airport** Located five miles east of Research Triangle Park, the Raleigh Durham International Airport (RDU) provides efficient and cost-effective travel options for Park companies and the entire Triangle area. There are 25 airlines operating at RDU, with 225 daily departures and 40 direct connection destinations. In 2003, RDU International Airport served over 7.9 million passengers. **Highways** North Carolina has the largest state-maintained highway system in the nation, with 78,000 miles of highways. The East-West Interstate Highway 40 bisects Research Triangle Park. I-40 connects North Carolina with California. **Average driving times to the local universities are:** Duke University in Durham 10 minutes University of NC at Chapel Hill 15 minutes NC State University in Raleigh 20 minutes North-South Interstate Highway 85 passes through Durham. I-85 forms the backbone of the largest manufacturing region in the Southeast, reaching from Richmond, VA to Atlanta, GA **Average driving times to various locations are:** Washington, DC 5 hours , Charleston, SC 5 hours, Atlanta, GA 7 hours New York, NY 12 hours North-South Interstate Highway 95 is 40 minutes east of Research Triangle Park, easily accessible on I-40. I-95 is the major east coast interstate, linking New England to Florida. Other highways connecting the cities of the Research Triangle area include:

US Highways	State Highways
US 1	NC 54
US 15	NC 55
US 64	NC 98
US 70	NC 147
US 501	NC 751

Railways

Four thousand miles of track and twenty railroads crisscross North Carolina. Freight service in the Research Triangle Park area is provided by Norfolk-Southern Railway and CSX Transportation.

Rail lines run on both the eastern and western borders of Research Triangle Park between Raleigh and Durham.

2 main water ports i.e. Morehead city and wilimington

60 lodging properties with 7000 guest rooms, 5 million visitors each year

Duke Energy provides electricity to businesses and residences

Ports

North Carolina's port Cities are Wilmington and Morehead City. Exporters who use the North Carolina ports at Morehead City and Wilmington, and who are subject to payment of North Carolina income taxes, can apply and qualify for a tax credit. This tax credit can be earned on cargo wharfage and handling fees exceeding the average for the last three years inclusive of the current tax year. The excess of those fees for wharfage and handling paid directly or indirectly to the North Carolina State Ports Authority can be credited against the taxes due the state, up to 50% of the total tax liability for each tax year. The maximum cumulative credit that may be taken may not exceed $1 million. Any unused credit may be carried forward for the succeeding five years. For more information, contact the North Carolina Ports Authority at (800) 334-0682.

Source: North Carolina State Ports Authority

There are 2 main water ports that exist in North Carolina being Morehead City and Wilmington.

Port of Wilmington (Foreign Trade Zone # 66)
PO Box 9002
2202 Burnett Blvd.
Wilmington, NC 28402
Phone: 800-334-0682
Fax: 910-343-6225

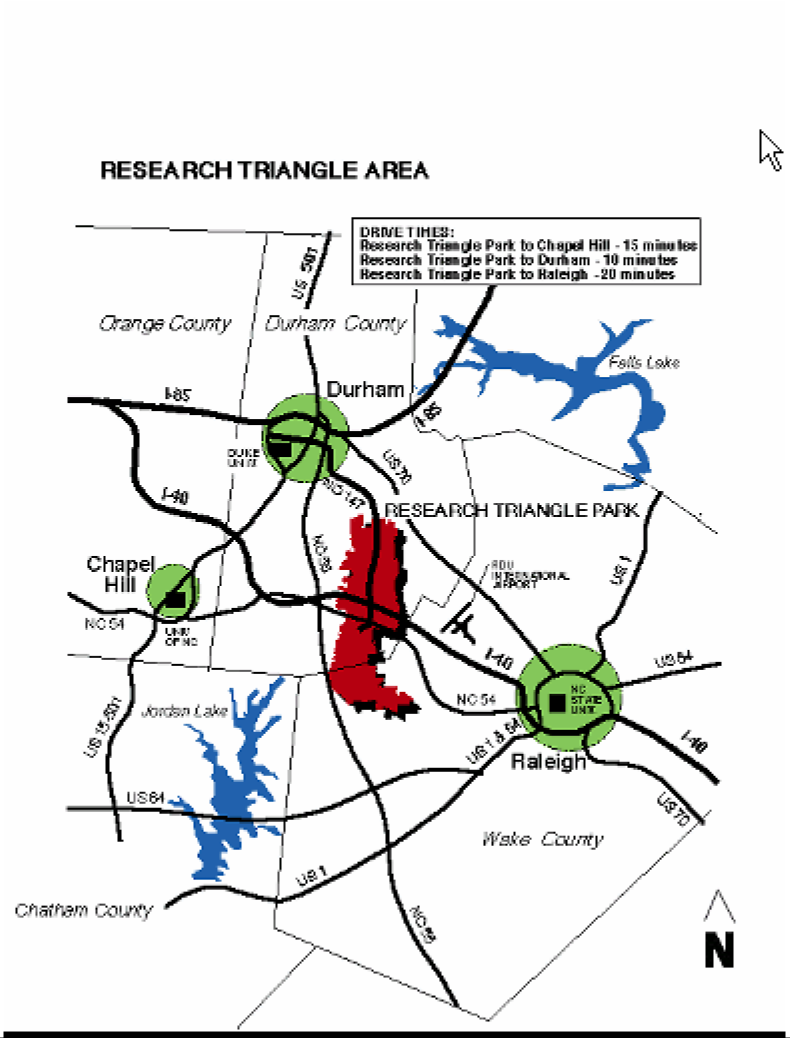
The Port of Wilmington is located on the east bank of Cape Fear River and is 26 miles from open sea.

- Channel is 38 ft., mean low water
- Wharf frontage is 6,768 ft. long, divided between container and general cargo operations
- Deck height averages 12 ft. above mean low water
- Wood chips handling facility which can outload over 800 tons per hour with a 70,000 ton storage capacity
- Other berths with contiguous open apron areas up to 300 ft. wide
- Well-lighted terminal and 24-hour security provided by North Carolina State Certified Port Police

Port of Morehead City (Foreign Trade Zone # 67)
P.O. Drawer 829
113 Arendell Street
Morehead City, NC 28557
Phone: 252-726-3158
Fax: 252-726-1190

The Port of Morehead City is four miles from the open sea and is situated along the Newport River and Bogue Sound.

- 5,500 ft. of continuous wharf
- Two berths served by modern ship-loader and maximum load out rate of 3,000 tons per hour of bulk cargo
- Dry-bulk facility (used mainly for phosphate) with 225,000-ton capacity warehouse, conveyor system and ship loader
- Wood chips handling facility which can out load 1,000 tons per hour with a two million-ton annual capacity
- Concrete capped sheet pile bulkhead, solid fill with 1,000 psf concrete deck with rubber and/or timber fender system
- Deck height averages 10 ft. above mean low water
- Apron widths from unrestricted to 45 ft. opposite transit sheds
- Roll-on/Roll-off ramp
- Well-lighted wharf areas and 24-hour security
- Barge Fleeting Area

Map of Tech Park		
Principal Technologies in Tech park		Biotechnology/Biopharmaceutical Computer Hardware/Software Chemicals Environmental Sciences Information Technology Instrumentation Materials Science Microelectronics Pharmaceuticals Public Health Telecommunications Statistics
Production, Revenues and Export Statistics		▪ 131 organizations are located in the Park ▪ 100 research and development-related organizations ▪ Approximately 50% of the employees in the Park work for multinational corporations ▪ An estimated 38,000 full-time employees work in RTP (About 44,000 including contract employees) ▪ 99.4 % of employees work for R&D related organizations ▪ Almost 40% of Park employers have less than 10 employees ▪ The average salary of an RTP employee is $56,000 **Retail sales have soared from 1970 ($ 5B) to today ($20B)**

Availability of Human Capital

University Enrollment – Fall 2003

Raleigh	NC State University	29,854
	Shaw University	2,616
	Meredith College	2,152
	St. Augustine's College	1,635
	Peace College	693
Durham	Duke University	12,398
	NC Central University	7,191
Chapel Hill	University of NC at Chapel Hill	26,359
RTP Area	**Total University Enrollment**	**82,898**

Source: UNC Statistical Abstract 2003-2004

University Placement Services

The Research Triangle Area Universities have an exceptional resource to offer employers. Within twenty minutes of Research Triangle Park, employers can access thousands of prospective candidates in a wide variety of fields of study. The Placement Offices of the universities have begun coordinating their efforts with a regional approach to employers' needs.

Placement services will assist employers in hiring both upcoming graduates and experienced alumni. This service is designed to help organizations of all sizes meet their professional personnel needs.

Services include:

- Resumes of prospective candidates, both entry-level and experienced
- Individual interviews with qualified and interested candidates

The candidates are:

- Qualified with Bachelor, Master or Doctorate level degree in a broad range of specialties
- Experienced with up to 20 years in the work force
- Often willing to relocate for career opportunities

Availability of Finance and Investment Capital

Investment:

- Development surpasses 19 million square feet
- Capital investment exceeds $2 billion

Total payroll is estimated at $2.7 billion

Resources and Incentives

Industrial Revenue Bonds (IRB):

The state of North Carolina can issue industrial revenue bonds. The state's principal interest in these bonds is to assist new and expanding industry while seeing that North Carolinians get good jobs at good wages.

There are three types of bond issuances as follows:

- Tax Exempt - The maximum bond amount is $10 million in any given jurisdiction, because the income derived by the bond holder is not subject to federal income tax.
- Taxable - These bonds are not exempt from federal tax, but they are exempt from North Carolina taxes. These bonds may exceed $10 million in bond amount.
- Exempt Facility/Solid Waste Disposal Bond - These bonds are subject to volume cap although there is no restriction on amount and the interest on these bonds is federally tax exempt.

-IRB funds can be used only by a company engaged in some manner of manufacturing,
-IRB proceeds may be used only for land, building and equipment,
-The company must agree to pay its employees greater than or equal to the average weekly manufacturing wage of the county or the state average weekly manufacturing wage plus 10%. Normally it takes 8-10 weeks for an application to be approved.

SBA Loans
The Small Business Administration provides loan guarantees and other financing programs for small business as well as programs for long-term capital asset acquisition. Local contact can be made through your bank or through the following organization:

Business Energy Improvement Program (BEIP)
The Business Energy Improvement Program provides loans between $100,000 and $500,000 to industrial and commercial businesses located or moving to North Carolina. Loans can be financed for up to seven years at interest rates equal to 50% of the average (high and low) T-bill rate for the past year or five percent, whichever is lower. The current rate is 5%, which is the maximum. Funds are provided from a pool of $2,500,000 designated for energy related capital improvement such as cogeneration, energy saving motors, boiler improvements and low energy use lighting. Loans will be processed first-come first-served basis.

State Technology Based Equity Funds
The State of North Carolina operates several programs providing equity type financing for technology based enterprises as well as a network of incubators transferring new technologies into commercial application.

Job Development Grant Program
The State of North Carolina recently implemented a Job Development Grant Program for major investment/job creation projects considering the State. Guidelines for the program are still being developed. The initial

		program will be effective January 1, 2003 - December 31, 2004. There will be only 15 projects funded annually at a total of $10 million per year. The program is highly discretionary. A 5-person review panel - composed of the Secretary of Commerce, the Secretary of Revenue, the Director of the Office of State Budget and Management, an appointee of the Speaker of the House and an appointee of the President Pro Tempore of the Senate - will review applications and determine projects to be funded. Three of the five must vote approval. Given these requirements, it is anticipated that only major projects, with significant job creation and investment potential will be considered. The only limitations relative to type of project are that no retail establishments or sports facilities are eligible. The grant program allows for up to 75% of the state personal income taxes withheld for the new jobs that are created to be set aside in a fund, up to $6,500 per job. In "tier 4 and 5" counties, such as Durham and Wake Counties, twenty-five percent of this amount is placed in an infrastructure fund to be used by rural communities. The remaining portion can be refunded to the company in the form of a cash grant. This grant could be in effect for up to 12 years. Again, the 5-person review panel will determine both the percentage to be provided and the length of time that the grant will be applied on a case-by-case basis. **William S. Lee Act Tax Credits** All tax credits can be taken against the income, franchise tax or gross premiums and have a carry-forward for each eligible year. The total value of credits cannot exceed 50% of annual tax liability. Eligible firms are in Manufacturing and Processing, Distribution and Warehousing, Data Processing, Air Courier Services, and Central Administrative Offices; these firms must also pay at least 110% of the average county wage. Research Triangle Park is located in Tier 5 of the William S. Lee Act economic development tiers. This means that a company would be eligible for a $500 tax credit per new job created and a four-percent investment tax credit for machinery and equipment investments over $2 million. More details about the William S. Lee Act can be obtained by contacting our office or talking to a representative at the North Carolina Department of Commerce.
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Regional Production System Linkages		University Research Park, Inc. University of North Carolina at Charlotte, 1980 Two Wachovia Center, Charlotte, NC 28282 University and Business Partnerships involving RTP Cooperative relationships exist between Research Triangle Park companies and the three major research universities, as illustrated by the following table from Fall 2002:

Fiscal Year 2002	DUKE	NC STATE	UNC-CH
Total Research Dollars Expended	$441,533,000	$290,018,000	$370,806,000
Total Federal Monies	$261,356,000	$75,204,000	$254,571,000
Total State & Local Monies	$11,258,000	$85,879,000	$14,984,000
Total Industry Monies	$99,807,000	$31,579,000	$6,601,000
Total Other Monies	$31,787,000	$7,587,000	$94,650,000
National Ranking in Federally Funded Research (2002)	16th	35th	29th

*Source:
NSF Acacdemic Research Expenditures Fiscal 2002

Tenant Firms

131 organizations are located in the Park

Here is a list of top employers in RTP

Companies (by Industry)

Biotechnology/Agricultural Biotechnology/Biological Agents (15 Companies and 2,022 Employees)

AlphaVax, Inc.
Affinergy Inc.
BASF Corp. Agricultural Products
Bayer CropScience
BiogenIDEC
BioAbility, LLC
Cromoz, Inc.
Endacea, Inc.
Endocrinology
Icoria Inc. (Formerly Paradigm Genetics)
Norcarex Bio Corporation
North Carolina Biotechnology Center
Schwarz Biosciences, Inc.
Syngenta Biotechnology, Inc.

		Xsira Pharmaceuticals (Formerly Norak Biosciences Inc.) Zen-Bio **Chemicals (3 Companies and 245 Employees)** American Assocation of Textile Chemists and Colorists International Union of Pure and Applied Chemistry Reichhold **Electronics/NanoTechnologies (10 Companies and 860 Employees)** Accurate Electronics Inc. BOC Gases CopperRoad Corp. Delta Products Corporation DuPont i Technologies Instrumentation Associates MCNC Grid Computing and Network Serivces MCNC Research & Development Institute Mechanical Specialty Contractors, Inc. Sumitomo Electric Lighwave Corporation Troxler Electronic Laboratory, Inc. U.S. Environmental Protection Agency USDA Forest Service - Southern Station
		Environmental Science (9 Companies and 2,454 Employees) CIIT Centers for Health Research General Engineering & Environmental of NC, Inc. ICF Consulting ManTech Environmental Technology, Inc. National Toxicology Program National Institute of Environmental Health Science Tetra Tech U.S. Environmental Protection Agency USDA Forest Service - Southern Station **IT/Informatics/Pervasive Computing/Telecommunications (21 Companies and 20,405 Employees)** Accurate Electronics Brown Computer Company Caspian Networks Checkfree Investment Services Cisco Systems Computer Sciences Corporation EMC Corporation Ericsson IBM Learning Machines Lenovo Mi-Co Network Appliance

Network Development Group
Nortel Networks
RadarFind Corp.
Snowfin, LLC
Software Development Europe, Inc.
Sony Ericsson
UAI Technology, Inc.

Materials Science (2 Companies and 35 Employees)

Bekaert Corporation-Bekaert Fibre Technologies
Bekaert Flex Circuit Venture

Miscellaneous (19 Companies and 3,047 Employees)

Burroughs Wellcome Fund
Credit Suisse First Boston
Council for Entrepreneurial Development
Elixar Inc.
GlaxoWellcome Foundation
GretagMacbeth LLC
ISA
Motor Equipment Manufacturer’s Association
National Humanities Center
National Institute of Statistical Sciences
North Carolina State Education Assistance Authority
North Carolina Technological Development Authority
RTI International
SandTec Media Corp.
SciMetrika , LLC
Sigma Xi, The Scientific Society
Statistical & Applied Mathematical Sciences Institute
Triangle Research Collaborative
Underwriters Laboratory

Pharmaceutical/Health Services/CRO/CCO/Medical Devices
(21 Companies and 6,433 Employees)

Aeolus Pharmaceuticals (Formerly Incara)
Affinergy Inc.
BD Technologies
Cognosci, Inc.
CPKD Solutions, LLC
Cytospect Pharma Inc.
Diosynth Biotechnology
Duke Mass Spectrometry
Eisai Inc.
GlaxoSmithKline
Governor’s Institute on Alcohol and Substance Abuse
Howard Associates, LLC
Kucera Pharmaceuticals
Lineberry Research
North Carolina Healthcare Information & Communications Alliance

North Carolina Medical Device Organization
SCYNEXIS, Inc.
Synthon Pharmaceuticals
Talecris Biotherapeutics
Triumph Health Care, Inc.
United Therapeutics Corporation

Tenant Firm Profiles

- Biotechnology/Agricultural Biotechnology/ BiologicalAgents (15 Companies and 2,022 Employees)
- Chemicals (3 Companies and 245 Employees)
- Electronics/NanoTechnologies (10 Companies and 860 Employees)
- Environmental Science (9 Companies and 2,454 Employees)
- IT/Informatics/Pervasive Computing/Telecommunications (21 Companies and 20,405 Employees)
- Materials Science(2 Companies and 35 Employees)
- Pharmaceutical/Health Services/CRO/CCO/Medical Devices (21 Companies and 6,433 Employees)
- Miscellaneous (19 Companies and 3,047 Employees)

Assessment of Success or Failure

Facts and Figures: Long-Term Growth

Population Growth for the Last 43 Years

Year	# of R&D Companies	# of Service Companies	Developed Sq. Footage	# of Employees
1960	3	1	204,000	500
1965	8	2	384,645	908
1970	20	6	2,396,512	8,000
1975	23	26	2,827,412	10,400
1980	40	33	6,468,912	17,500
1985	54	55	10,440,582	26,000
1990	66	47	11,620,000	32,500
1995	97	39	14,345,900	35,000
2000	106	35	15,500,700	44,000
2001	109	35	18,496,510	42,000
2002	100	35	19,125,842	38,500

Income in the Triangle:

County	Per Capita	Population
Wake	$35,864	719,520
Durham	$31,129	239,733
Orange	$34,182	117,515
	(2003 figures)	(2004 figures)

Source: Bureau of Economic Analysis and US Census

- An estimated 38,000 full-time employees work in RTP (About 44,000 including contract employees)
- 99.4 % of employees work for R&D related organizations
- Almost 40% of Park employers have less than 10 employees
- The average salary of an RTP employee is $56,000

1956 patents in North Carolina, Patents per 1000 individuals in S&E occupations - 20.9

KSFs or KFFs		**All above mentioned factors are strong indicators of successful Technology park.**

A1.1.2 Stanford Technology Park, USA

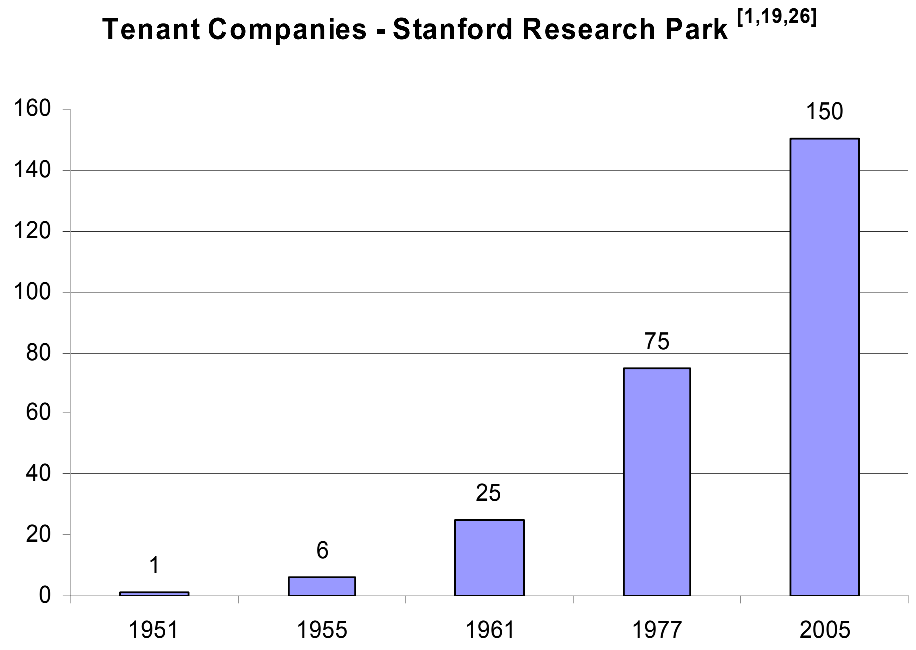
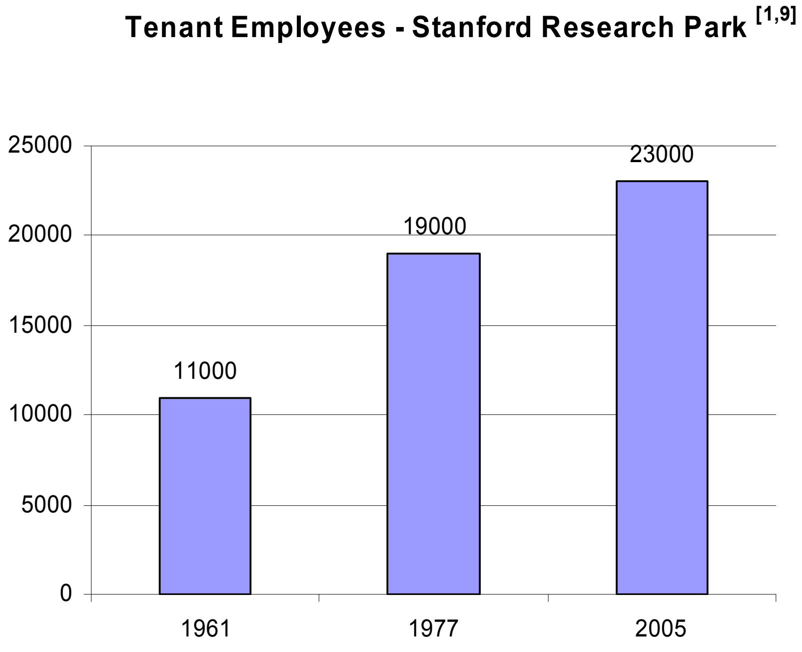
1		PROFILE INFORMATION
Common Name of Technology Park		Stanford Research Park
Location		City of Palo Alto State of California United States of America
Phone		Stanford Management Company (650) 926-0200
Email address		Jean Snider: jsnider@stanford.edu Managing Director
Formal park Name		Stanford Research Park
Address Line 1		Stanford Management Company 2770 Sand Hill Road
Address Line 2		Menlo Park, CA 94025
Primary Focus		"Predominantly scientific, technical and research oriented with major representation in the fields of electronics, space, biotechnology, computer hardware and software."[1]
Principal Owner/Investor		Stanford University [1]
Background		Initiated in 1951 by the brilliant, and visionary Stanford University Engineering Dean, Frederick Terman, Stanford Research Park is today a standard against which all other technology parks are measured. Amidst the post-World War II economy and an emerging Cold War environment, Stanford University's Engineering School found itself in a rather unique situation. First, it was benefiting from the receipt of significant federal funds, the purpose of which were to convert vital research into functional, usually defense-oriented, technology.[12,13,15] Second, it owned more than 8,000 acres of undeveloped farmland that, according to the original endowment from Leland Stanford, could not be

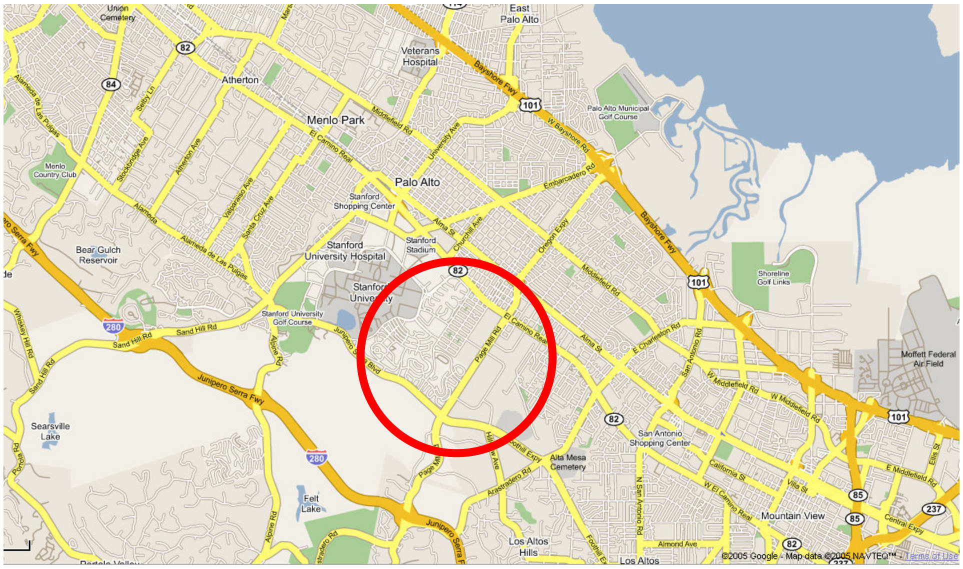
sold.[16,17] It was a combination ripe with opportunity.

Driven by his vision that industry and education should be collaborative forces[13,16,18,19], and a secondary desire to see Stanford engineering graduates get jobs in the area[16, 20], Terman had the university set aside 800 acres for "Stanford Industrial Park" (later to become "Stanford Research Park"[18]. Companies could get long term leases, gain the benefits of technology transfer from a world class university, and attract employees with tremendous climate and proximity to Stanford.[3,13,15,17,21] Stanford Industrial Park become the first university-owned technology park in the world[16,22] , spawning what many believe to be the birthplace of Silicon Valley[4,16, 23].

The first lessee to the Park was Varian Associates, followed soon thereafter by companies such as General Electric, Hewlett Packard, Eastman Kodak, Admiral Corporation, Watkins Johnson. By the early 1960s, more than 25 companies occupied 652 acres and employed 11,000 people[19]. Today, more than 10 million square feet of buildings covering 700 acres[1] are occupied by more than 150 companies employing some 23,000 people.

Continuing in the tradition of Fredrick Terman, Stanford University still nutures long term relationships with its Park tenants. And after more than 50 years, the Park maintains its dedication to high technology and research-based companies, surrounded by professional and service organizations essential to the success of those in the Park[25].

		 Tenant Companies - Stanford Research Park [1,19,26]  Tenant Employees - Stanford Research Park [1,9]
Vision		"Stanford Research Park has a world-class reputation as one of the largest and best-known parks in the world, offering its companies a unique set of benefits. First and foremost, as part of the Stanford

		community, the Park offers access to one of the world's finest research universities. Of special value to industry is the opportunity to form close relationships with Stanford faculty and students."[24]
Location		"Stanford Research Park is truly the nucleus of the Silicon Valley, the entrepreneurial core from which new ideas emerge, grow and evolve. The Research Park is nearly equidistant from San Francisco (32 miles to the North) and San Jose (20 miles to the South) and is considered the economic center of Silicon Valley. The Research Park is bound by Stanford University to the north, El Camino Real Commercial Corridor to the east and theFoothill Expressway to the west. The research park is located in close proximity to Highways 101 and 280, the two main highways linking SanFrancisco and Silicon Valley."[4] 
Facilities		Land Size: 700 acres[1] Developed Buildings and Facilities: 10 million sq. ft[1] No. of Buildings: 162[1] Vacancy Rate: 6%[5]

Services

Zoning: General LM and LM5 combining district (limited industrial/research park) as follows:[1]

	LM	LM5
Minimum Lot Size	1 acre	5 acres
Floor Area Ratio	40%	30%
Maximum Bldg. Coverage	30%	15%
Parking	1 space per 300 building sq. ft	

Transportation:[1]

Airports:

- San Jose Airport (20 miles south)
- San Francisco International Airport (13 miles north)
- Palo Alto Airport

Freeways:

- Highway 280 with the Page Mill Road exit providing direct access into the Stanford Research Park
- Highway 101

Rail:

- Caltrans (stops at California Ave. with bus connection to the Park)

Bus Service:

- Santa Clara County Transit (stops throughout the Park)

Map of Tech Park

Principal Technologies in Tech park

- Bioscience
- Computers
- Software
- Defense Electronics
- Medical Electronics
- Internet connectivity

Production, Revenues and Export Statistics

	Stanford Research Park	Cities of Palo Alto & Mountain View	County of Santa Clara	Silicon Valley
Productivity				$224k/ employee
Patents				371 per 100k residents[6]
Federal R&D				$3.2B[6]
R&D investment				12%[6]
Jobs	23k[1]			1.2m[6]
Foreign "in-sourced" jobs				20k[6]
Average pay				$64.7k[6]

Availability of Human Capital

	Cities of Palo Alto (PA) & Mountain View (MV)	County of Santa Clara	Silicon Valley	SF Bay Area
Population	PA: 59k[8] MV:71k[9]	1.7m[7]	2.4 m[6]	
High School	PA: 42k	928k	82%[6]	

Education	96.3% MV: 47k, 88.7%	83.3% [7]		
Bachelor's degree	PA: 32k 74.4% MV: 29k, 55.4%	450k 40.5%[7]	40%[6]	
Graduate or Professional degree	PA: 19k 43.0% MV: 13k, 25.5%	183k 16.4%[7]		
Unemployment			6.7%[10]	

Availability of Finance and Investment Capital

	Stanford Research Park	Cities of Palo Alto & Mountain View	County of Santa Clara	Silicon Valley
Venture Capital Financing				$7.1B[6]

Resources and Incentives

"It does not appear that the Stanford Research park offers financial incentives in order to convince businesses to locate there. The prestige of a Stanford Research Park address is incentive enough"[11]

Tenant Firms

Firm	**Web Site**	**Sector**	**Address**	**Street**
Stanford School of Medicine	http://med.stanford.edu/		1050	Arastradero Road
Alta Vista	http://www.altavista.com/about/	Web search	1070	Arastradero Road
IPV Value			1070	Arastradero Road
Voltage Technologies			1070	Arastradero Road
Wilson Sonsini Goodrich & Rosati	http://www.wsgr.com/WSGR/Index.aspx	Legal	601	California Avenue
Marcus & Millichap Inc.	http://www.marcusmillichap.com/	Real Estate Brokerage	777	California Avenue
Summerhill Homes			777	California Avenue
Pacific Property Company	http://www.summerhillhomes.com/	Home construction	777	California Avenue
Hanover Financial Co.	http://www.hanoverfinancial.com/	Real Estate Finance	777	California Avenue
RR Donnelley Financial	http://www.rrdonnelley.com/wwwRRD/AboutUs/Locations/Financial.asp		855	California Avenue
Stanford Genome Technology Center	http://www-sequence.stanford.edu/		855	California Avenue
DNAX	http://www.dnaxresearch.com/		901	California Avenue
Stanford Genome Technology Center	http://www-sequence.stanford.edu/		975	California Avenue
Dechert LLP	http://www.dechert.com/		1117	California Avenue
Stanford Hospital and Clinics	http://www.stanfordhospital.com/default		1451	California Avenue
ALZA Corporation	http://www.alza.com/		1501	California Avenue
SEQUUS Pharmaceuticals			1501	California Avenue

			Agilent Technologies			1601	California Avenue	
			Palo Alto Research Center			3333	Coyote Hill Road	
			Arastra Inc.			3475	Deer Creek Road	
			Kealia, Inc.			3475	Deer Creek Road	
			SAP America Inc.			3475	Deer Creek Road	
			Airgo Networks Inc			3495	Deer Creek Road	
			Hewlett Packard			3495	Deer Creek Road	
			Agilent Technologies			3500	Deer Creek Road	
			Burr, Pilger, Mayer LLP			3000	El Camino Real	
			Cupertino National Bank			3000	El Camino Real	
			Swiss Law Group LLP			3000	El Camino Real	
			The Intern CEO Network			3000	El Camino Real	
			Navigant Consulting			3000	El Camino Real	
			CineArts Theatre			3000	El Camino Real	
			Café Piazza			3000	El Camino Real	
			Citigroup Private Bank			3000	El Camino Real	
			City National Bank			3000	El Camino Real	
			Silicon Valley Bank			3000	El Camino Real	
			Venture Banking Group			3000	El Camino Real	
			Cooley Goodward			3000	El Camino Real	
			Equity Office Properties			3000	El Camino Real	
			Federal Express			3000	El Camino Real	
			White and Case			3000	El Camino Real	
			NIF Ventures			3000	El Camino Real	
			Coamerica Bank			3000	El Camino Real	
			Morgan Lewis			3000	El Camino Real	
			Mobius Venture Capital			3000	El Camino Real	
			Milbank, Tweed, Hadley & McCloy, LLP			3000	El Camino Real	
			Bain & Co.			3000	El Camino Real	
			Colliers International			3000	El Camino Real	
			Coudert Brothers			3000	El Camino Real	
			Mayer, Brown, Rowe, and Man			3000	El Camino Real	
			Credit Suisse First Boston			2400	Hanover Street	
						2550	Hanover Street	
			Pillsbury Winthrop, Shaw, Pittman LLP			2475	Hanover Street	
			Forum for Women Entreprenuers			2475	Hanover Street	

			Crimson Ventures SV LLC			2475	Hanover Street	
			Street Nanosys Inc.			2625-2631	Hanover Street	
			Optobionics			2627	Hanover Street	
			Marcus & Millichap Inc.			2626	Hanover Street	
			Stanford University Hospital			2670-2690	Hanover Street	
			Mayfield Fire Station			2675	Hanover Street	
			Hewlett Packard			3000	Hanover Street	
			Novellus Systems			3175	Hanover Street	
			Hewlett Packard			3200	Hanover Street	
			Lockheed Martin			3251	Hanover Street	
			Squire Sanders & Dempsey			600	Hansen Way	
			Bank of America			600	Hansen Way	
			Baker & McKenzie			620	Hansen Way	
			Kirkpatrick & Lockhart, Nicholson, Graham, LLP			630	Hansen Way	
			Baker & McKenzie			660	Hansen Way	
			Finnegan Henderson Farabow Garrett & Dunner			700	Hansen Way	
			CPI			811	Hansen Way	
			Dorsey & Whitney, LLP			850	Hansen Way	
			Finnegan Henderson Farabow Garrett & Dunner			850	Hansen Way	
			Staubach Co.			900	Hansen Way	
						900	Hansen Way	
			Varian Medical Systems			911	Hansen Way	
			Varian Medical Systems			913	Hansen Way	
			Merrill Lynch			3075	Hansen Way	
			McKinsey & Company			3075	Hansen Way	
			Varian Medical Systems			3100	Hansen Way	
			Varian Inc.			3120	Hansen Way	
			Varian Medical Systems			3130	Hansen Way	
			SVF Credit Union			3140	Hansen Way	
			Varian Medical Systems			3140	Hansen Way	
			Hewlett Packard			3200	Hillview Avenue	
			Goldman Sachs			3201-3251	Hillview Avenue	
			CNF Transportation			3240	Hillview Avenue	

			Kestrel Institute			3260	Hillview Avenue	
			Garage Technology Ventures			3300	Hillview Avenue	
			TIBCO Software			3301-3307	Hillview Avenue	
						3330	Hillview Avenue	
						3340	Hillview Avenue	
			Stanford Medical Center			3373-3375	Hillview Avenue	
			Brandon Communications			3400	Hillview Avenue	
			Xerox Palo Alto Research Center			3400	Hillview Avenue	
			Packet Design			3400	Hillview Avenue	
						3401	Hillview Avenue	
			DPIX/Xerox			3406	Hillview Avenue	
			Corvigo			3408	Hillview Avenue	
			Addison Avenue Federal Credit Union			3408	Hillview Avenue	
			Solid Core Systems			3408	Hillview Avenue	
			Tumbleweed & Netzentry			3408	Hillview Avenue	
			SAP			3410	Hillview Avenue	
			EPRI (Electric Power Research Institute)			3412	Hillview Avenue	
			EPRI			3420	Hillview Avenue	
			See Commerce			3420	Hillview Avenue	
			Reliance Communications			3420	Hillview Avenue	
			SAP			3421	Hillview Avenue	
			Kalobias			3431	Hillview Avenue	
			Roche Biosciences			3431	Hillview Avenue	
			EPRI			3440	Hillview Avenue	
			Varian Medical Inc.			3450	Hillview Avenue	
			Flextronics			3460	Hillview Avenue	
			University Club of Palo Alto			3277	Miranda Avenue	
			Foothills Tennis & Swimming Club			3351	Miranda Avenue	
			Affymax			4001	Miranda Avenue	
			Bonsai			4005	Miranda Avenue	
			TNS Prognostics			4005	Miranda Avenue	
			Technofyn			4005	Miranda Avenue	
			NIT Data Corp			4005	Miranda Avenue	
			Toyota Infotechnology Center, USA			7009	Miranda Avenue	
			Bosch Corporation			4009	Miranda Avenue	
			Volkswagen of America			4009	Miranda Avenue	
			Teachers Curriculum			4009	Miranda Avenue	

Institute				
Replicus Software Corp.			4015	Miranda Avenue
Symphony Technology Group			4015	Miranda Avenue
Vyyo			4015	Miranda Avenue
Wilson Sonsini Goodrich & Rosati			650	Page Mill Road
YMCA			735	Page Mill Road
Morrison & Foerster			755	Page Mill Road
NY Stock Exchange			845	Page Mill Road
Genercor International			925	Page Mill Road
Wilson Sonsini Goodrich & Rosati			950	Page Mill Road
Genercor International			975	Page Mill Road
PMR King & Wood			975	Page Mill Road
Wilson Sonsini Goodrich & Rosati			975	Page Mill Road
Ernst & Young			1001	Page Mill Road
Bank of America			1001	Page Mill Road
Manatt, Phelps & Phillips			1001	Page Mill Road
Beckman Coulter			1050	Page Mill Road
Egon Zehnder International			1290	Page Mill Road
Phalanx Bio Inc.			1400	Page Mill Road
Stanford University Libraries			1450-1451	Page Mill Road
Stanford Federal Credit Union			1500	Page Mill Road
Citigate Cunningham			1500	Page Mill Road
Package Satellite Offices			1500	Page Mill Road
Stanford University Medical Center			1500	Page Mill Road
Palantir Technologies			1530	Page Mill Road
CV Therapeutics			1651	Page Mill Road
Accenture			1661	Page Mill Road
Studley			1661	Page Mill Road
Wall Street Journal			1701	Page Mill Road
Rimmerman & Co.			1801	Page Mill Road
Gibson, Dunn & Crutcher			1801	Page Mill Road
See Commerce			1801	Page Mill Road
McDermott, Will, & Emery LLP			1801	Page Mill Road
Good Earth Deli			1801	Page Mill Road

		Connetics			1841	Page Mill Road
		VMWARE			3145	Porter Drive
		Epson Research			3145	Porter Drive
		McDermott Will & Emery			3150	Porter Drive
		Rinat			3155	Porter Drive
		Hines			3155	Porter Drive
		Stem Cells			3155	Porter Drive
		Cellerant Therapeutics			3155	Porter Drive
		Connetics			3160	Porter Drive
		Telik			3165	Porter Drive
		Lockheed Martin			3170	Porter Drive
					3172	Porter Drive
		CV Therapeutics Inc.			3174	Porter Drive
		Lockheed Martin			3176	Porter Drive
		Jazz Pharmaceuticals			3180	Porter Drive
		Pharmagensis			3183	Porter Drive
		EMC / VMWARE			3210	Porter Drive
		Hewlett Packard			3215	Porter Drive
		Information Express			3221	Porter Drive
		Reviews.com			3221	Porter Drive
Assessment of Success or Failure		Successful				

KSFs or KFFs

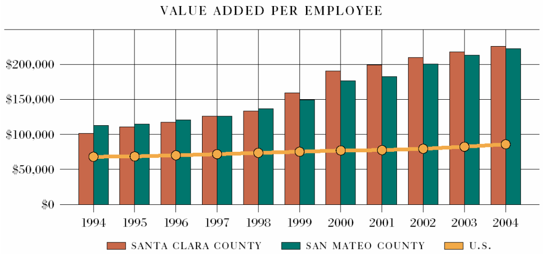
The factors listed below have been rated as follows:

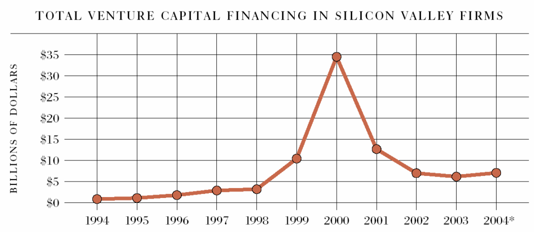
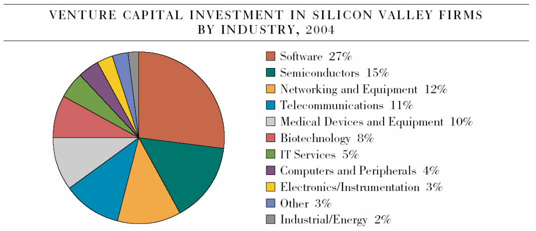
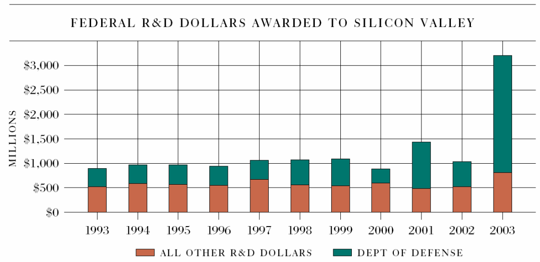
- 5: High positive effect on the park's success
- 4: Moderate positive effect on the park's success
- 3: Neutral – no effect on the park's success
- 2: Moderate negative affect on the park's success
- 1: High negative effect on the park's success

Stanford Research Park is generally judged by experts worldwide to be one of the parks against which all others are measured. Factors with a rating of four or five have additional details. Factors deemed neutral or negative have been given no details.

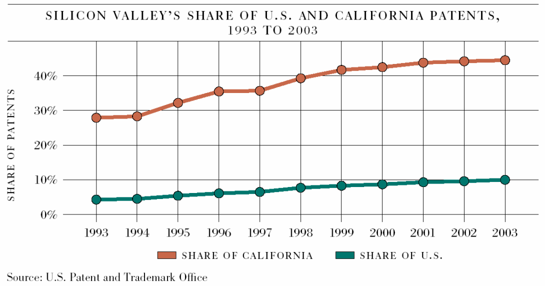
Many of the Key Success Factors for Stanford Research Park (SRP) are derived from analysis of literature related to Silicon Valley as a whole. Because SRP has been located in the heart of Silicon Valley for more than 50 years, most factors driving the success of Silcon Valley have also driven the success of SRP.

When using a source specific to Stanford Research Park, the acronym "SRP" will precede the source reference. Sources relating to Silicon Valley as a whole will be preceded by the acronym "SV".

Global Integrated Technology (GLOINTECH) Key Success Factors	**Source reference(s)**
Availability of Labor	**Rating = 5**
Availability of skilled labor	SV: [13] – Chapter 2 SV: [14] – Chapter 10 SV: [15] – Chapters 6, 9 SV: [16] – Chapters 1, 2, 5 SRP: [21] – Paragraph 11
Proximity of colleges with graduate degrees	Stanford, UC Berkeley, UCSF SRP: [4] – Page 7 SV: [13] – Chapter 1 SV: [14] – Chapter 2 SV: [15] – Chapters 1, 9 SV: [16] – Chapters 1, 10, 11
Labor productivity	SV: [6] – page 20 
Availability of Capital	**Rating = 5**
Availability of venture capital	SV: [14] – Chapters 8, 9 SV: [15] – Chapters 5 SV: [16] – Chapters 13, 14 SV: [6] – Page 17

	  Source: PricewaterhouseCoopers/Thomson Venture Economics/National Venture Capital Association MoneyTree™ Survey *Estimate
Availability commercial financing	SV: [16] – Chapter 15
Availability of government funding	SRP: [12] – Paragraph 38 SV: [15] – Chapters 3, 9 SV: [16] – Chapters 3, 8 SV: [6] – Page 18 
Infrastructure availability	**Rating = 4**
Availability of land	SRP: [16] – Chapter 11 (page 230 specific to SRP)
Market Demand Conditions	**Rating = 5**
Access to international buyers	SV: [16] – Chapter 6, 12
Firm Strategy, Structure and Rivalry	**Rating = 5**
Presence of local competitors	SV: [13] – Chapter 2
Proximity to complementary firms	SV: [15] – Chapter 8
Presence of leading firms	SRP: [24] - Tenant List e.g. H.P., Varian, Agilent, PARC, SAP
Presence of Suppliers and Related Industries	**Rating = 5**
Availability of local suppliers	SV: [15] – Chapter 7
Presence of partner/related firms	SV: [13] – Chapter 2
Availability of logistics services	SV: [13] – Chapter 2
Availability of accounting & legal services	SV: [13] – Chapter 2 SV: [15] – Chapter 4 SV: [16] – Chapters 1, 16, 18
Availability of financial & tax services	SV: [13] – Chapter 2
Availability of consulting firms	SV: [16] – Chapter 19

Business and Socio-Political Climate	**Rating = 5**	
Support of private enterprise & entrepreneurs	SV: [13] – Chapter 2 SV: [15] – Chapters 8, 10 SV: [16] – Chapters 1, 6, 7, 12,	
Climate for risk-taking	SV: [15] – Chapter 8 SV: [16] – Chapters 1, 10, 17	
Climate for business innovation	SRP: [13] – Chapter 1 SRP: [15] – Chapter 8 SRP: [16] – Chapters 10 SRP: [19] – Paragraph 19 SRP: [24] – Page 1 SV: [15] – Chapter 9 SV: [16]: – Chapter 5	
Results-oriented climate	SV: [16] – Chapters 1, 6	
Business & government collaboration	SV: [16] – Chapters 1, 3	
Quality of life in the country	SRP: [17] – Paragraph 14 SRP: [21] – Paragraph 11 SV: [16] – Chapter 1	
Existence of Industry Linkages	**Rating = 4**	
High level of inter- and intra-firm linkages	SV: [13] – Chapter 6 SV: [16] – Chapters 2, 11	
Presence of cross-border industry networks	SV: [16] – Chapter 12	
Collaboration of firms & research institutions	SRP: [13] – Chapter 1 SRP: [15] – Chapters 8. 9 SRP: [16] – Chapter 10 SRP: [24] – Page 2	
Interfirm sharing of labor and other resources	SV: [13] – Chapter 2	
Agglomeration and Clustering Economies	**Rating = 4**	
High firm & supplier concentration	SV: [15] – Chapter 6	
Knowledge spillovers	SV: [13] – Chapter 2 SV: [16] – Chapters 1, 2, 11	
Public Policy	**Rating = 4**	
Presence of trade & investment policies	SV: [16] – Chapter 9	Please see additional comments below for factors related to public policy
Presence of tax laws and tax incentives	SV: [16] – Chapter 9	
Presence of financial policies and subsidies	SV: [16] – Chapter 9	
Presence of incorporation/bankruptcy laws	SV: [16] – Chapter 9	
Presence of R&D policies and incentives	SV: [16] – Chapter 9	
Protection of private and intellectual property	SV: [16] – Chapter 9	
Fiscal, trade and investment incentives	SV: [16] – Chapter 9	
Innovation and Entrepreneurship	**Rating = 5**	
Presence of local-entrepreneur-started firms	SRP: [16] – Chapter 11	
Patent and intellectual property activity	SV: [6] – Page 16	

	 Source: U.S. Patent and Trademark Office
Existence of leading/anchor firms	**Rating = 4**
Number of local industry leader firms	SRP: [24] – Tenant List e.g. H.P., Varian, Agilent, PARC, SAP
Number of international firms	SRP: [24] – Tenant List e.g. H.P., Varian, Agilent, PARC, SAP
Element of Chance	**Rating = 4**
Reputation as a leading location	SRP: [14]
Geographical location of park	SRP: [24]
Origins of firm's founders in region	SRP: [14]
Presence of Historical Factors	**Rating = 4**
Historical presence of key firms in region	SRP: [13], [14], [15], [16], [17], [21],
Past history of links of incoming firm and regional firms	SRP: [13], [14], [15], [16], [17], [21],

Comments on Public Policy relating to Silicon Valley and Stanford Research Park:

Public policy has been favorable to Silicon Valley and Stanford Research Park throughout their 50 plus years of growth and change.

Henry S. Rowen of Stanford University points out that the American system of business regulation is decentralized yet more coherent than is first obvious and is "more favorable to new business ventures than are those of virtually all other countries"[16]. The system is favorable to the marketplace and to competition, "protecting people through transparency and disclosure rather than microregulation"[16].

Rowen confirms positive public policy in such areas as[16]:

- Labor laws that are conducive to innovation, risk and possible failure.
- Financial regulations favorable to entrepreneurship and fast-moving organizations.
- Decentralization in public funding of higher education and the existence of many private universities, creating competition for faculty, students, and research monies.

Rowen determined that the government plays three roles with respect to success in Silicon Valley and presumably Stanford Research Park[16]. Government is a:

1. Rule Maker in such areas as taxation and finance.
2. Buyer of goods and services for military and other federal requirements.
3. Financier and Early-Stage Developer, funding research in emerging technologies that appear to benefit defense and/or other federal needs.

Stuart W. Leslie of John Hopkins University is a bit more strong about the federal government's role in the success of Stanford Research Park and Silicon Valley. Leslie states that "without massive federal investments (mostly for defense) in Stanford's academic programs and in the surrounding industrial community, neither the university nor the region could have grown as quickly"[16].

Annalee Saxenian of U.C., Berkeley explains how changes in U.S. immigration policies beginning in 1965 have increased the number of high quality Chinese and Indian professionals in Silicon Valley.

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[3] Mackun, P., Silicon Valley and Route 128: *Two Faces of the American Technopolis*, NT Engineering Association of Silicon Valley, http://www.ntea.net/?q=node/view/68, retrieved 11/20/2005.

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[16] Lee, C., Miller, W., Hancock, M., Rowen, H. (2000); The Silicon Valley Edge, A habitat for Innovation and Entrepreneurship; Stanford University Press.

[17] O'Mara, M (2/4/2004), *Red Tile Roofs in Bangalore: Stanford's look copied in Silicon Valley and beyond*; Stanford Report; http://news-service.stanford.edu/news/2004/february4/silicon-24.html, Retrived 12/15/2005.

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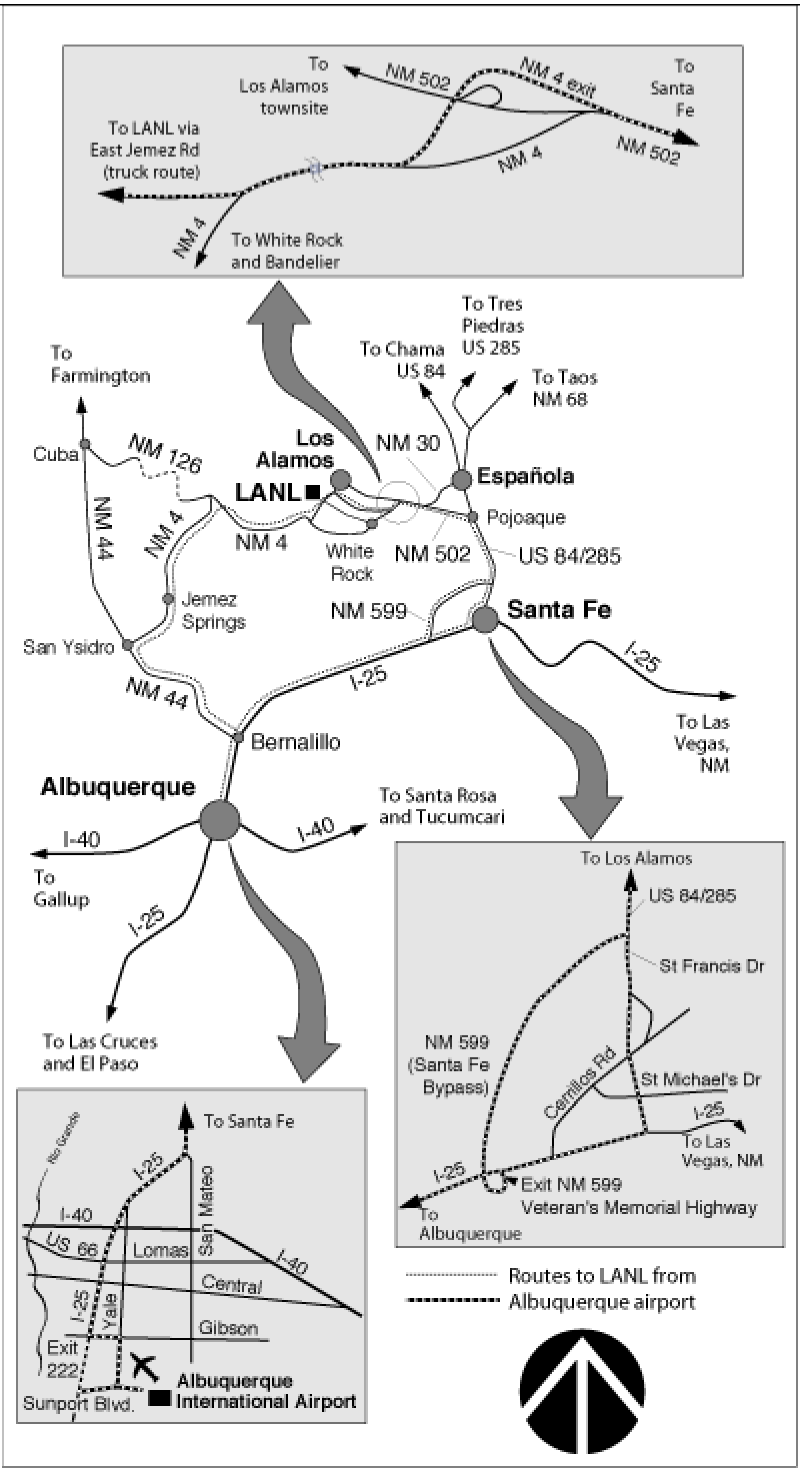
A1.1.3 Los Alamos Research Center, USA

1		PROFILE INFORMATION
Common Name of Technology Park		Los Alamos Research Park
Location		City of Los Alamos State of New Mexico United States of America
Phone		Leasing contact Kevin Holsapple 505-661-4806
Email address		kevin@losalamos.org
Formal park Name		Los Alamos Research Park
Address Line 1		190 Central Park Square
Address Line 2		Los Alamos, NM 87544
Fax		505-662-0099
Primary Focus		Research and Development[1]
Principal Owner/Investor		Los Alamos Commerce and Development Corporation [2]
Background		Los Alamos Research Park (LARP) is owned by Los Alamos Commerce and Development Corporation (LACDC, founded in 1983). The Research Park opened in the spring of 2001.[2] LACDC negotiated and obtained a 55 year leasehold interest on the land, master-planned the property for development, borrowed the money needed to build a first building, built the building, and is the owner/operator of the research park.[7]

		Part of LACDC’s mission is to serve as a change agent, taking risk to promote positive economic development activities; the research park project offers the best potential for enabling a more diverse economy in Los Alamos and the region over the next 5-10 years.[7] LACDC is attempting to: [7] • Diversify the regional economy from LANL; • Give the region greater flexibility to respond to shifts in LANL operations; • Promote long term stability for the regional economy • Create new jobs and retain existing jobs in the region; • Give people in the region more employment options; • Help LANL (DOE/UC) to better achieve its aims in the areas of: ○ Its national security mission ○ Improvement of LANL's ability to interface with business and the international S&T community ○ Development of dual use research and commercialization opportunities ○ Expanding LANL mission options ○ Increase demand for service businesses • Develop opportunities for manufacturing and distribution business development in the region LACDC is motivated to support a research park because: [7] • The single best strength we have in the community upon which to build our economy is the assembled brainpower and problem solving capability we have here; a research park can take advantage of this strength • R&D jobs are relatively high paying jobs • Private R&D with a stake in Los Alamos will help develop broader

		political support for the sustenance of LANL • We believe that the market for the research park is corporate R&D outposts, R&D consortia activities, corporate headquarters, and local technology business start-ups that can realize value from close proximity with the brainpower, unique facilities, and problem solving capabilities resident in the Los Alamos community. The total buildout (of the park) is limited by the number of people who can work there. The DOE land lease with LACDC limits this to 1500 people. Our business planning suggests a ten to fifteen year period is expected to absorb this amount of new activity in Los Alamos. This projection is based on the space absorption experience of rural research park developments elsewhere. [7]
Vision		Consider the possibility of locating R&D activities next to Los Alamos National Laboratory (LANL). Extensive, groundbreaking research is always being conducted at this internationally renowned research institution in a broad range of disciplines. Think of the benefits that this scientific wellspring can have on your own research efforts. And imagine the prospect of collaborating with LANL as well as other companies and organizations that are located here. Los Alamos Research Park is designed to enhance the collaborative efforts of tenants with one another, with LANL, and with other R&D activities throughout the world.[1]
Mission		The LACDC works to provide for a viable community, by enabling a sustainable economy.
Location		Los Alamos National Laboratory Los Alamos, New Mexico

		LOS ALAMOS 502 285 SANTA FE 25 ALBUQUERQUE


To Los Alamos townsite
NM 502
NM 4 exit
To Santa Fe
To LANL via East Jemez Rd (truck route)
NM 4
NM 502
NM 4
To White Rock and Bandelier
To Tres Piedras US 285
To Chama US 84
To Taos NM 68
To Farmington
Cuba
NM 126
Los Alamos
LANL
NM 30
Española
Pojoaque
NM 44
NM 4
NM 4
White Rock
NM 502
US 84/285
Jemez Springs
NM 599
Santa Fe
San Ysidro
I-25
NM 44
I-25
To Las Vegas, NM
Bernalillo
Albuquerque
To Santa Rosa and Tucumcari
I-40
I-40
To Gallup
I-25
To Las Cruces and El Paso
To Los Alamos
US 84/285
St Francis Dr
NM 599 (Santa Fe Bypass)
Cerrillos Rd
St Michael's Dr
I-25
To Las Vegas, NM
I-25
Exit NM 599
Veteran's Memorial Highway
To Albuquerque
To Santa Fe
Rio Grande
I-25
San Mateo
I-40
US 66
Lomas
I-40
Central
I-25
Yale
Gibson
Exit 222
Albuquerque International Airport
Sunport Blvd.
Routes to LANL from Albuquerque airport

Facilities		The forty acre site is master planned to accomodate five buildings on 20,000 square foot pads plus two parking structures. An attractive, energy-efficient 83,000 square foot building housing high quality office and light laboratory space was completed in 2001. Space possibilities in the Research Park are flexible and range from suites in the existing multi-tenant building to entire buildings designed and built to tenant specifications.[1] • Building One was completed for initial occupancy in February, 2001. It is an 83,000 square foot multi-tenant facility incorporating both office and light laboratory activities. • The facilities in the Research Park offer superior teleconnectivity to advance the collaborative efforts of tenants with other R&D activities, including Los Alamos National Laboratory. • Tenants are eligible to use more than 40 LANL laboratories and facilities, including the research library and advanced computing power, on a contractual basis.

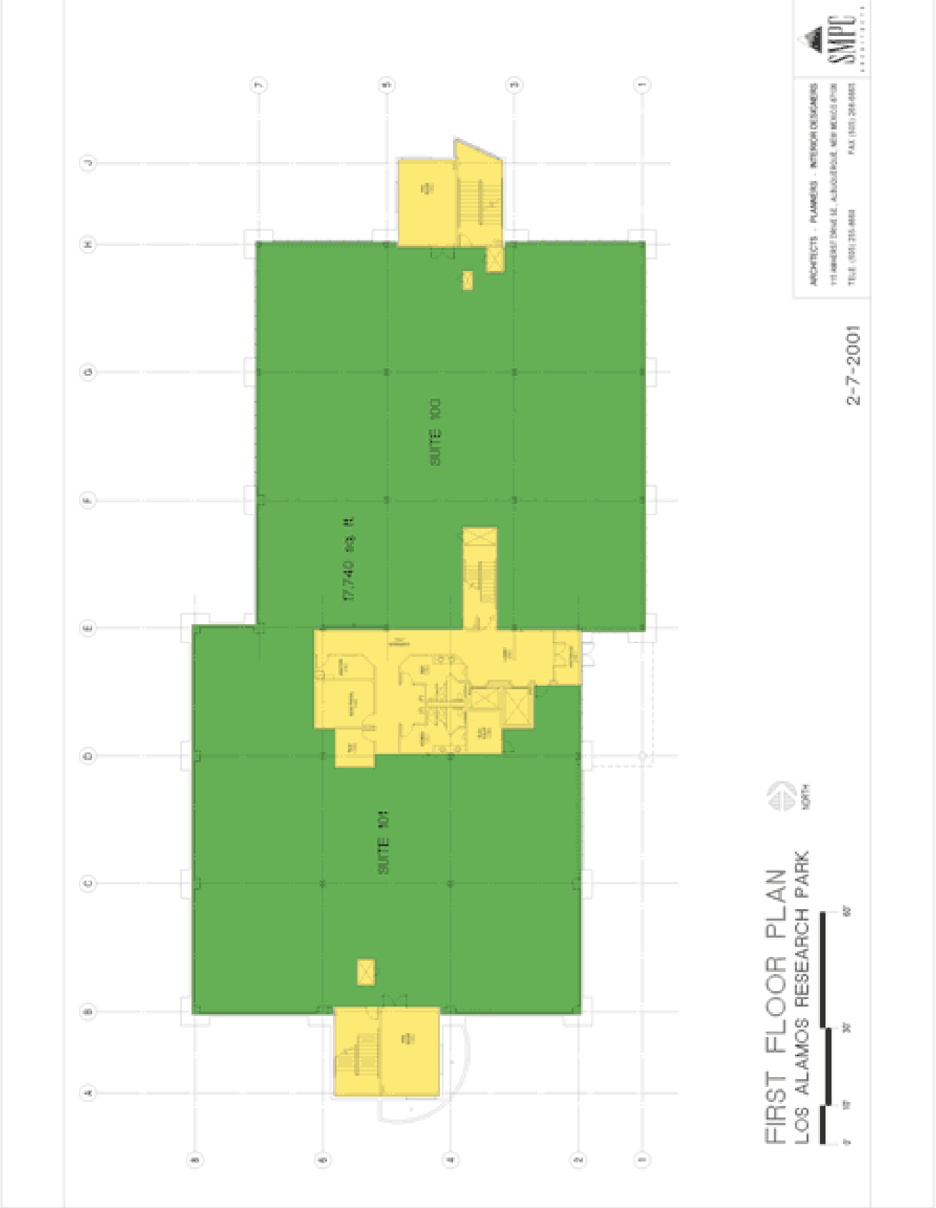
Services

Forty Two Hundred West Jemez Road is the first building at the new Los Alamos Research Park. This 83,000 gross square foot building features "Tech Shell" design that enhances the flexibility of the building to accommodate a broad range of research and development uses. The building features steel beam construction, poured concrete floors, and a masonry finish. Initial tenant activities in the building include a Superconductivity Technology Center, a supercomputer development effort, a Motorola Laboratories site, and a coffeehouse/café providing informal meeting place. The Tech Shell attributes allow the building to offer space capabilities exceeding those of a typical office building:

Attribute	**4200 West Jemez Building**
Zoning	R&D
Laboratory Use	Lab use per UBC Type B Occupancy
Electrical Capacity	25 watt/gsf -Total building maximum service rating. 10 watts/gsf - Average tenant allocation for tenant equipment.
Electrical Supply	2.0 MW; 2500 amp, 480Y/277V or 208y/120V available to tenants. Dedicated 15KV feeder from local substation to LARP.
Back-up Electrical	Provisions for generator location and connectivity provided
Floor Loading	125 psf
Floor-to-Floor Clearance	14 Ft.
Floor Plate	20,000 sf/floor
HVAC Capacity	113,000 cfm Total building (1.4cfm/gsf average)
Chilled Water Capacity	345 gsf/ton average
Service Chase Provisions	3 vertical chases with space for tenant facilities
Telecommunication System	World Class Telecommunications facility. Avaya PBX and Voice mail. SONET on site from Quest with managed Internet services and secure networking.
Data Communication Connectivity	OC-48 Fiber into building and fiber backbone within building.
Telecommunication Duct Bank Provisions	Extensive duct, conduit, and cable tray capacity linking telecom rooms on all floors
Equipment rooms and storage facilities	Space available for tenant equipment storage and operation remote from leased space; gas storage building space available remote from main building

Price/Rent		What will be the cost of space in the Synergy Center? Full service space pricing in the Synergy Center has four components: 1) space charges; 2) common service charges; 3)base telecom service charges; 4) variable monthly charges for usage of business equipment, long distance, etc. Call or email us for a floorplan and pricelist. What is included in the monthly price? Full service rates on small office space includes built-out office space, basic furnishing and seating, active VLAN port(s), basic phone package including phone instrument and voicemail, all utilities and shares of maintenance, taxes, and insurance, parking, use of shared conference room facilities, use of shared business equipment (copier, fax, etc.), and shared reception service. (does not include long distance charges, phone directory assistance charges, phone directory listing charges, per copy charges, or per fax charges) How long do I have to commit to for space in the Synergy Center? Terms are flexible, but the minimum term that will generally be considered is 12 months.

Map of Tech Park




SUITE 200
1,220 S.F.
SUITE 202
1,656 S.F.
1,661 S.F.
1,622 S.F.
SUITE 203
2,552 SQ. FT.
SUITE 204
1,473 S.F.
SUITE 201
7,250 S.F.
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NORTH
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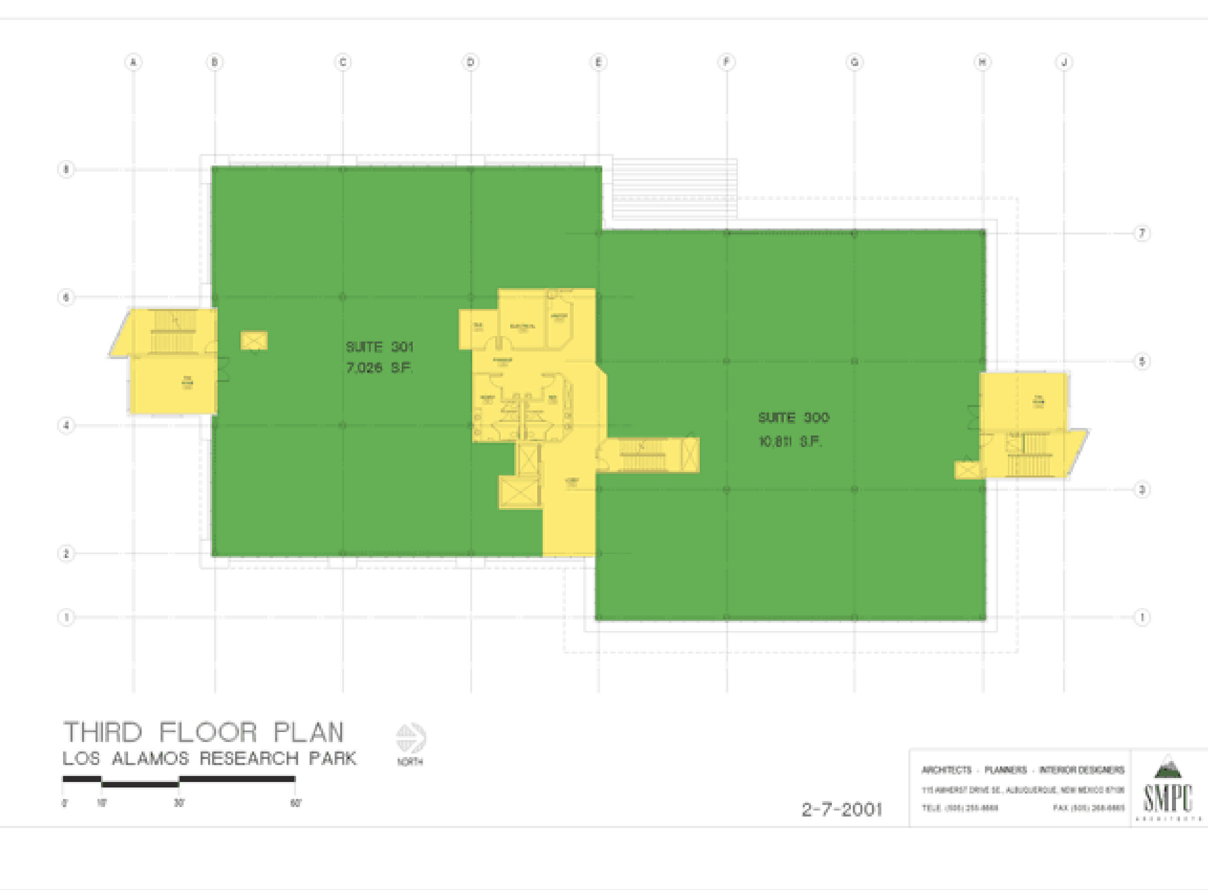
SECOND FLOOR PLAN
LOS ALAMOS RESEARCH PARK
2-7-2001
ARCHITECTS · PLANNERS · INTERIOR DESIGNERS
SMPC
ARCHITECTS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SUITE 301
7,026 S.F.
SUITE 300
10,811 S.F.
THIRD FLOOR PLAN
LOS ALAMOS RESEARCH PARK
NORTH
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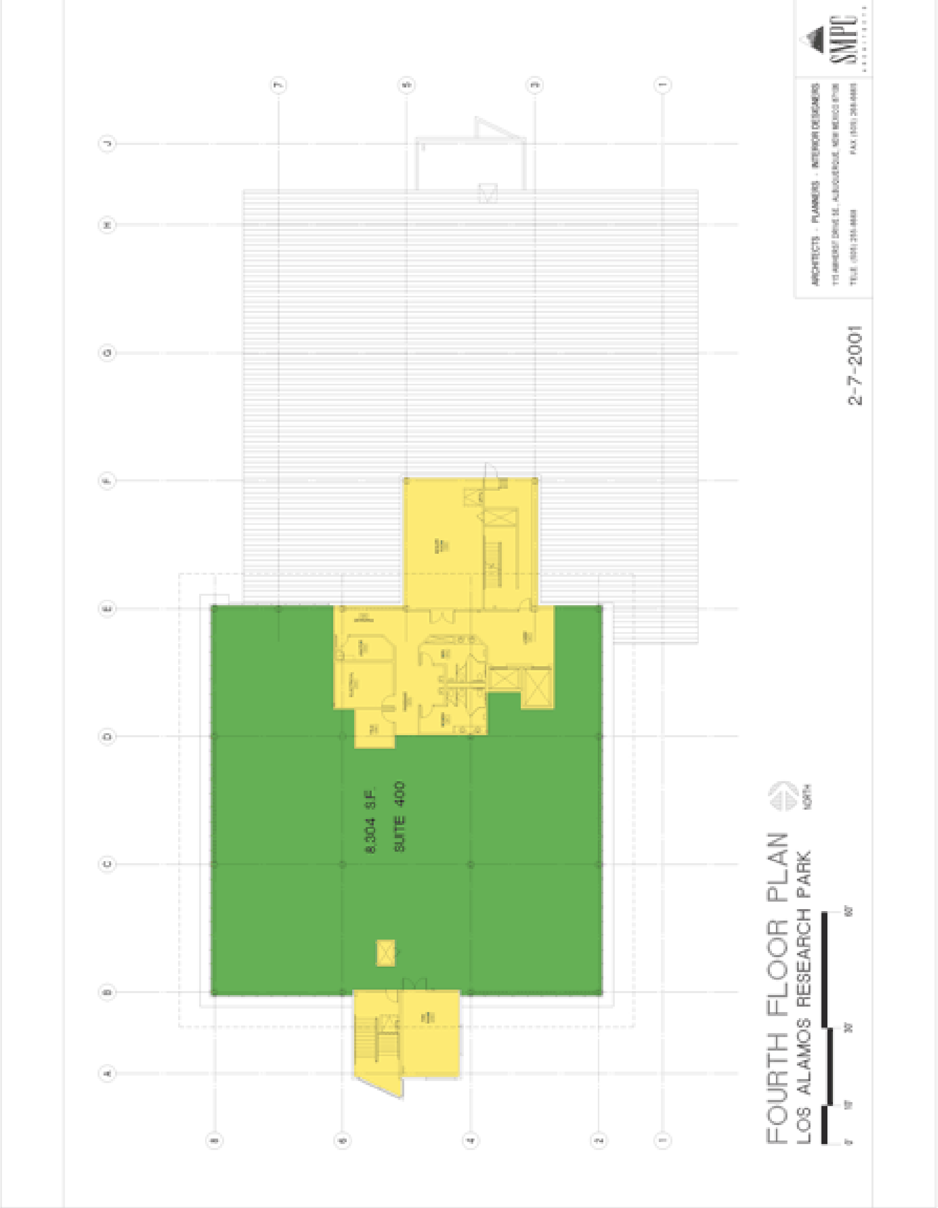
10'
30'
60'
2-7-2001
ARCHITECTS · PLANNERS · INTERIOR DESIGNERS
SMPC


8,304 S.F.
SUITE 400
FOURTH FLOOR PLAN
LOS ALAMOS RESEARCH PARK
NORTH
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30'
60'
2-7-2001
SMPC
ARCHITECTS · PLANNERS · INTERIOR DESIGNERS
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Aerial view of the Research Park

View of Building 1 from the southeast

View of Building 1 from the south

View of Building 1 from the east

Forest surrounding the Research Park

Principal Technologies in Tech park

Scientific research at Los Alamos National Laboratory has evolved from the days of the Manhattan Project into a broad, multi-disciplinary activity. Endeavors as varied as the human genome project, the most advanced supercomputing capabilities in the world, environmental technologies, and advances in microelectronics are now part of LANL's areas of inquiry. The opportunity to advance collaborative efforts in these disciplines has increased tremendously in the past few years, making Los Alamos an important center for researchers on the leading edge of science.

Availability of Human Capital

	County of Los Alamos
Population	18k[3]
High School Education	12k, 96.4%[3]
Bachelor's degree	8k, 60.5%[3]
Graduate or Professional degree	5k, 36%[3]
Unemployment	4.3% (Santa Fe Metropolitan Area) [3]
Availability of skilled labor	Limited workforce[7,8]
Cost of labor	Highest median income in the U.S. ($93,089)[8,9]

Availability of Finance and Investment Capital		LACDC is financing the start-up of the research park from its own assets and has borrowed most of the money needed for physical development from commercial lenders. Grants from the Regional Development Corporation, Los Alamos County, and the Economic Development Administration provided funding to help enable this financing. Ultimately, the tenants of the research park will pay for its existence.[7]
Resources and Incentives		Incubator: The Synergy Center is being developed as an "economic development incubator" housed in 7100 s.f. of space on the third floor of Los Alamos Research Park building one. The Synergy Center is targeting a mix of several types of clientele: • Entrepreneurial technology-based start-ups • Small "outposts" and "landing parties" of corporate R&D activities doing collaborative work with LANL and/or other Research Park tenants • Consortia and institute presence [1]
Regional Production System Linkages		The Los Alamos Research Park is being designed to encourage and enhance the collaborative efforts of tenants with one another, with LANL, and with other research and development activities throughout the world. The Research Park complements "Outward Look", an initiative of LANL to promote value-added collaboration and technology transfer.[1] **Tech Transfer Division** The Laboratory's Technology Transfer Division helps move technologies from the Lab to the marketplace to benefit society and the U.S. economy. We do this by licensing a wide range of cutting-edge technologies to companies that have the financial, R&D, manufacturing, marketing, and managerial capabilities to successfully commercialize Lab inventions. In addition, we manage Lab-industry research partnerships, ensure that inventions receive proper intellectual protection, license technology to start-up companies, and serve as the Lab resource on industry relations.[5]

		The Los Alamos National Laboratory (LANL) Technology Transfer Division is responsible for licensing technologies invented at the Laboratory to help U.S. companies increase their competitive capabilities. Technology transfer is an important, congressionally mandated part of the LANL mission. Los Alamos innovators have continually demonstrated that the Laboratory's world-class scientific achievements serve the nation and strengthen economic security by enhancing U.S. industrial competitiveness. The Laboratory's proven reputation for excellence—earned with more than 60 years of scientific contributions to the nation—continues to demonstrate its exceptional work in multiple disciplines to meet the challenges of a rapidly changing world. This work finds application in national security, the Laboratory's primary mission, as well as in commercial products that result from technology innovation. The efforts of Los Alamos staff to engage in technology transfer activities not only help the Laboratory attract new employees, program sponsors, and collaborators, but they also help the Laboratory comply with its contractual requirements. These activities contribute to the accomplishment of the programmatic mission while supporting continued scientific leadership.[6]

Tenant Firms		Advanced RealTime Technology
		Authentix
		Avanza Technologies
		Applied Monitoring and Transparency Laboratory
		BWX Technologies
		Hot Rocks Java Cafe
		Motorola Labs
		Radion Technologies
		Silicon Graphics
		Strategic Management Solutions
		Superconductivity Technology Center
		Synergy Center at Los Alamos Research Park
		Technology Ventures Corporation
		University of California
		University of California Jacobs School of Engineering
		Veriscape
		Zocher Corporation

Tenant Firm Profiles

Authentix http://www.authentix.com	As global leaders in product authentication, Authentix is committed to the detection and removal of counterfeit and adulterated products from our society. As the inventor and developer of many of the leading authentication nano-technologies in use today, we have a world-class technology portfolio. Moreover, our skills in applying those technologies to solve counterfeit, adulteration and smuggling issues for clients, ensures that we are a trusted partner of many of the world's leading brand owners and governments.
Avanza http://www.avanzatech.com	Avanza Technologies, Inc. is a designer of innovative solutions for developing, managing, and securing distributed information environments. Avanza develops technology and applications that provide identity-based transactions of secure context-aware intelligent information.
Applied Monitoring and Transparency Laboratory http://amtl.lanl.gov/	The Applied Monitoring and Transparency Laboratory (AMTL) displays, demonstrates, and tests effective techniques for monitoring international arms control and safeguards agreements by focusing on inspection systems, protocols, and transparency measures, providing confidence that nuclear weapons, fissile materials, and chemical and biological agents have been permanently removed or isolated from military programs.
BWX Technologies http://www.bwxt.com/about/	BWX Technologies, Inc. (BWXT) has been a leader in developing nuclear technologies since the 1940s. Throughout our history, we have consistently achieved excellence in the conduct of nuclear operations by meeting rigorous customer requirements and delivering some of the most sophisticated nuclear components ever produced.
Motorola Labs http://www.motorola.com/content/0,,258,00.html	We exist to create new disruptive technologies that will enhance easy, uninterrupted access to what people value most – communication, information, entertainment, monitoring, and control.
Radion Technologies http://www.radiative.com/	Transpire, Inc. (formerly Radion Technologies) provides revolutionary solutions for radiative transport simulations. Our goal is to continually develop and provide best-of-class software, services, and support, enabling engineers and scientists to rapidly and easily obtain accurate results to their most complex and demanding applications.
Superconductivity Technology Center http://www.lanl.gov/mst/stc/stc.shtml	The Superconductivity Technology Center (STC) coordinates a multidisciplinary program for research, development, and technology transfer in the area of high-temperature superconductivity. Our focus is on effective collaborations with American industry, universities, and other national laboratories to develop electric power and electronic device applications of high-temperature superconductors (HTS).
Technology Ventures Corporation	Technology Ventures Corporation developed a successful model to connect inventors, entrepreneurs and investors that

<table>
<tr><td>Assessment of Success or Failure</td><td></td><td>Partially Successful</td></tr>
<tr><td>KSFs or KFFs</td><td></td><td>Liturature suggests that Los Alamos Research Park (LARP) may only be partially successful at this time. The factors below relate to the Key Failure Factors (KFFs) limiting the success of LARP.
<table>
<tr><td>Availability of Labor</td><td></td></tr>
<tr><td>Availability of skilled labor</td><td>Limited workforce[7,8]</td></tr>
<tr><td>Cost of labor</td><td>Highest median income in the U.S. ($93,089). [8,9]</td></tr>
</table>

<u>Regarding government policy and LARP:</u>
Grants from the Regional Development Corporation, Los Alamos County, and the Economic Development Administration provided funding to help enable (the financing of LARP).[7]</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Sources:</td><td></td><td>[1] Los Alamos Research Park web site, http://www.la-rp.ws/, retrieved 8/21/2005
[2] Build New Mexico, About Los Alamos Research Park, http://www.buildnewmexico.org/larp/about/about.htm, retrieved 8/21/2005
[3] U.S. 2000 Census data, Los Alamos County, http://censtats.census.gov/data/NM/05035028.pdf, retrieved 11/28/05
[4] U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics, http://www.bls.gov/lau/lamtrk04.htm, retrieved 11/27/05
[5] Los Alamos National Laboratory, Tech Transfer Division, http://www.lanl.gov/partnerships/, retrieved 11/28/05
[6] Los Alamos National Laboratory, Techology Transfer Division FAQs, http://www.lanl.gov/orgs/tt/pdf/faq_0905.pdf, retrieved 11/28/05
[7] Los Alamos Commerce and Development Web Site, FAQ Page, http://www.losalamos.org/lacdc/faq/faqs.htm, viewed 12/19/2005.
[8] Sullivan, Patrick, LACDC, telephone interview 12/15/2005
[9] U.S.A. Today (12/1/2005), <i>Highest wages in East, lowest in South</i></td></tr>
</table>

A1.1.4 Virginia Biotechnology Park, USA

		PROFILE INFORMATION
Park Name		Virginia Biotechnology Research Park
Location		Richmond, Virginia, USA
Phone		804-828-5390
Fax		804-828-8566
Email address		vbrp@vabiotech.com
Address Line 1		800 E. Leigh St.
Address Line 2		Richmond, Virginia 23219, USA
Primary Focus		Drug development, medical diagnostics, biomedical engineering, forensics and environmental analysis.
Principal Owner/Investor		1. The Virginia Biotechnology Center was funded by a $5 million statewide bond referendum. 2. The Virginia Biotechnology Research Park Corporation is an IRS Code Section 501(c)(3) corporation organized exclusively for scientific, educational, and charitable purposes, and hence exempt from taxation. 3. The Research Park Authority is responsible for operating, managing and maintaining the park properties including oversight of sub-contractors. VCU's Real Estate and Foundation Services Department provides accounting guidance, support, and oversight of the Authority's financial statements and transactions.
Background		Richmond is located between two acknowledged East Coast bioscience clusters : Baltimore-Washington and Research Triangle. The Virginia Biotechnology Research Park is an attempt to position the Richmond area as the new center for biosciences by leveraging the region's attributes as a location for traditional industries, high-technology companies, entrepreneurship and business services. Established in 1996 as a partnership between Virginia Commonwealth University, the city of Richmond and the commonwealth of Virginia, the park is home to a mix of more than 50 bioscience companies, research institutes affiliated with the VCU Medical Center and major state and national medical laboratories and organizations involved with forensics, testing of biotoxins and management of the nation's organ transplantation process.
Vision		To create a nationally recognized identity for Greater Richmond as a preferred location for the biosciences industry by 2008.

Mission		To promote the advancement, nurture the environment and accommodate the functions of a thriving biosciences community in the greater Richmond area in partnership with Virginia Commonwealth Universityand other research institutions, business, government and not-for-profit organizations. The Park intends to carry out its mission by developing programs, initiatives and facilities that lead to the creation of new jobs companies and investment in the region which will result in enhanced economic opportunity for those who are directly and indirectly involved in the Park and its activities.
Goals		1. Assume the leadership in the creation of a comprehensive life sciences marketing strategy that will enhance the reputation of the region and encourage companies to locate in the Greater Richmond area. 2. Be the principal advocate for the continuing evolution of a business environment which supports biosciences entrepreneurship and development. 3. Encourage, support and facilitate the "harvesting" of technology and strategic utilization intellectual property generated at Virginia Commonwealth University as well as other area research institutions, laboratories and companies as a means of creating a strong and dynamic cluster of biosciences activity. 4. Assume the leading role in ensuring an availability of facilities and services required to support bioscience companies and facilitate the development of a "scientific community" which will enhance the collaborative benefits to life science companies, institutions and individuals. 5. Support and actively assist in the achievement of community goals, giving special attention to the neighbors of the Park in the areas of planning and infrastructure; workforce training and educational advancement; and enhanced economic opportunity for small, minority-owned and disadvantaged businesses.
Strategy		Bioscience companies cluster around research universities, laboratories and environments that facilitate the development of a "scientific community" which bolsters collaboration and stimulation. They also require specialized space and equipment to advance their science and bring new products and services to market. The Park is filling part of this role with incubators, business planning support and its proximity to VCU. Park management also realizes the need for specialized facilities, services, resources and proactive efforts to create opportunities for collaboration and information exchange. To achieve its community goals, the Park plans to identify opportunities to maximize the involvement of minority-owned, small and women-owned businesses in the planning, design and construction of new facilities at the Park.

Marketing Plan		1. Create a "Biosciences Marketing Team" representing the Park, state and local economic development authorities, VCU, the Virginia Biotechnology Association and others to maximize success when bioscience company prospects are considering locating in the Greater Richmond area. 2. Develop a cooperative public relations strategy to publicize the regions strengths, success stories and new initiatives which enhance the region's reputation as a bioscience center. 3. Conduct cooperative, targeted advertising and direct marketing campaigns to raise the region's visibility, generate recognition and identify prospects. 4. Organize cooperative special events and activities designed to bring prospective bioscience company decision makers to the area.
Location		The park is located in downtown Richmond with partnerships with neighboring Henrico and Chesterfield counties which allow it to extend its reach to accommodate larger companies on suburban campuses.
Public Policy		• Virginia's corporate income tax rate has been a stable 6% since 1972 • There is no local (Richmond) corporate income tax • At a 4.5% total rate, Virginia's sales tax rate is the 7th lowest in the country • Broad sales tax exemptions for business include all purchases used directly in production - gas, electricity or water delivered through mains, lines or pipes; and custom computer software
Services		• One of the nation's top 25 metro areas for biotechnology (Business Development Outlook, Nov-Dec 2003) • One of America's 30 most livable communities (Partners for Livable Communities, April 2004) • Ranked 19th of the nation's 361 MSAa (Metropolitan Statistical Areas) for long-term economical strength • One of America's top 25 large metro areas for doing business, rated 23rd (Inc. Magazine, May 2005) • RIC (Richmond International Airport), 10-minute drive from Research Park. RIC has 3 fixed base operators on the airport to provide fuel and maintenance services for corporate aircraft; it also has Foreign Trade Zone #207 with U.S Customs inspection on-site • Interstates 64, 95, 85, 195 and 295 serve the area. The average commute is 24 minutes. • More than 100 motor freight companies and brokers, including specialists in heavy hauling, over-dimensional loads, and liquid or dry bulk • Overnite Transportation has home office in Richmond, UPS headquarters and FedEx regional hubs are located in the area. More than 40 courier service companies - scheduled and rush, local, intrastate and interstate • Port of Richmond is domestic and international multi-modal freight and distribution center with weekly container service to Antwerp and

		Liverpool • Service to Canada, the Mediterranean, the Caribbean, South America, and Mexico. • Livestock export ramp, fumigation services, and U.S Customs and Border protection, on-site • Heavy-lift capability for project cargo and special projects • Supply Chain Services as part of a network of 600 warehouses nationwide • Local telephone service provided by Verizon, with AT&T and Cavalier Telephone being the major competitors • Extensive fiber optic network with digital switching capability and Synchronous Optical Network (SONET) self healing fiber optic rings insures uninterrupted service • Special Access Services (DS1, DS3, OC-12 and OC-48) available throughout the area • Wireless service (voice and data) available throughout the area from companies including T-Mobile, Verizon Wireless, NTELOS, Cingular, Sprint PCS, Alltel and Nextel • The Richmond Region has more than 1,700 physicians and 17 acute care and specialty hospitals with more than 3,700 staffed beds, including VCU's Medical College of Virginia (MCV) Hospitals with more than 700 beds and McGuire Veterans Affairs Medical Center with 427 beds • MCV Hospitals is the most comprehensive teaching medical center in Virginia and is regularly ranked among the top hospitals in America • VCU Medical School is one of the nation's largest medical schools and houses one of the nation's oldest transplant programs

Map of Tech Park

BioTech Center

- Virginia's first biotechnology incubator, completed and occupied in 1995. Funded by $5 million from a statewide bond referendum.
- 27,000 square foot facility includes business resource and support facilities from cold rooms, X-ray processing and laboratory washing to sterilization equipment.

BioTech One

- 100,000 square foot facility offering custom-fitted laboratory, research and office space.

BioTech Two

- 137,000 square foot state-of-the-art facility that houses the Virginia Division of Forensic Science and the state Office of the Chief Medical Examiner.
- The building, which is leased to the commonwealth of Virginia under a long-term arrangement, also houses the Institute of Forensic Science and Medicine.

		BioTech Three • Contains 31,000 square feet of office space. • Fully occupied by ancillary and support operations of the Virginia Commonwealth University Health System. BioTech Four • Contains 13,000 square feet of office space. • Fully occupied by ancillary and support operations of Virginia Commonwealth University. BioTech Five • Built-to-suit office-and-research facility leased under a long-term arrangement to Infilco Degremont Inc., the U.S. affiliate of the world's leading water treatment engineering company. • Infilco Degremont engineers use the 13,500 square foot facility to test potable water and waste water treatment modules for municipal, industrial and commercial applications. BioTech Six • 191,000 square foot office and laboratory facility that houses the Virginia Division of Consolidated Laboratory Services (DCLS). • The laboratory is one of the most advanced in the nation for public health and safety. • Part of a federal laboratory network certified by the Center for Disease Control, the U.S. Department of Agriculture and the Food and Drug Administration, among others. BioTech Seven • New headquarters for the United Network for Organ Sharing (UNOS) which maintains the national organ transplant waiting list and coordinates the matching and distribution of donated organs to waiting patients. BioTech Eight (Under development) • Will be the park's third multi-tenant facility. • Will contain custom-fitted laboratory, research and office space as well as various common facilities. BioTech Nine (Under development) • Will be home to the Philip Morris USA Research and Technology Center and home to up to 600 scientists, engineers and support staff.
The VBDC BioIncubator		The Virginia Biosciences Development Center is a non-profit, 501(c)(3) corporation established by the Virginia BioTechnology Research Park to provide business strategy and assistance as well as basic business support to seed, pre-sed and other tenant companies in the Park's incubator located in the BioTechnology Center.

		During its short history of seven years, more than 50 companies started in the incubator including 18 from VCU. Sixteen have successfully graduated, with four having relocated to larfer space in the Park. Three companies – Insmed Inc., Allos Therapeutics Inc. and Commonwealth Biotechnologies, Inc. – are now publicly traded firms. The companies that graduated now account for several hundred jobs in central Virginia that did not exist seven years ago.
Production, Revenue and Export Statistics		• Operating revenues for the Research Park are derived from ○ non-capitalized leases ○ contributions from the State of Virginia, Virginia Commonwealth University or other contributed income ○ ownership and management of parking lots within the footprint of the Research Park ○ other miscellaneous revenue such as vending machine commissions, event fees for conference facilities, tenant fax and copying fees etc.
Availability of Human Capital		• 1,350 scientists, researchers, engineers and technicians employed in the research park in 575,000 square feet of space in 8 buildings • Virginia Commonwealth University (VCU) is ranked by the Carnegie Foundation as a Doctoral Research - University Extensive • 0 of VCU's graduate and professional programs have been ranked by U.S. News and World Report as among the best in the nation • MCV's Dept of Pharmacology and Toxicology ranks in the top 10 of NIH funded Pharmacology and Toxicology programs • Virginia Commonwealth University, Virginia Polytechnic Institute and State University, University of Richmond and Virginia State University are in close proximity of the Park
Resources and Incentives		• Virginia's corporate income tax rate has been a stable 6% since 1972 • There is no local corporate income tax • At a 4.5% total rate, Virginia's sales tax rate is the 7th lowest in the country • Broad sales tax exemptions for business include all purchases used directly in production - gas, electricity or water delivered through mains, lines or pipes; and custom computer software
Tenant Firms		**Private Sector Companies** <u>Abtech Scientific, Inc.</u> Designs and produces biosensors, biochips and related technologies for throughput screening of samples of DNA, RNA and proteins. <u>Allos Therapeutics, Inc.</u> Develops and commercializes innovative drugs for improving cancer treatments <u>AVB Solutions</u> Develops custom research compliance software solutions. Assist organizations in meeting the requirements set forth by governing and accreditation bodies.

Bill Police, LLC
Assists businesses in managing their cell phone bills more cost effectively by simplifying the bill into one esy-to-read format, identifying and correcting billing errors with the carrier, suggesting more cost effective alternatives and providing historical trend analysis.

Bio Track, LLC
Develops and commercializes biomedical products for promising R&D projects at Virginia Commonwealth university and the VCU Medical Center.

Boehringer Ingelheim Chemicals
Produces and supplies ingredients for the pharmaceutical business of its parent company, Boehringer Ingelheim GmbH of Germany.

Boehringer Ingelheim Pharmaceuticals
Produces prescriptive and over-the-counter medicine to treat several diseases including coronary, central nervous system and respiratory diseases as well as HIV and arthritis. The pharmaceutical division is the largest unit of Boehringer Ingelheim GmbH of Germany.

Castle Technologies Inc.
Develops and implements enterprise-wide health informatics applications.

Cellpoint Diagnostics Inc.
Medical diagnostics company focused on developing new tools for the screening, diagnosis and monitoring of cancer through the examination of bodily fluids.

Ceres Biotechnology, Inc.
Developed a digital technology inspired by biosonar that allows blind babies to hear ultrasonic echoes.

eduSoft, LLC
Designs and impleents software tools for research drug design.

Immunotox, Inc.
Provides in vivo and in vitro immunotoxicological assessment for the pharmaceutical, chemical and food industries.

Infilco Degremont, Inc., North America Research and Development Center
Tests portable water and wastewater treatment moducles for municipal, industrial and commercial applications for the world's leading water treatment engineering company.

Intelliject, LLC
Develops cutting-edge auto-injector drug delivery technologies.

		Kinnakeet Biotechnology, Inc. Offers quality protein expression and purification services. Living Microsystems, Inc. Utilizes living cells on chips to produce major breakthroughs in diagnostics, therapeutics and drug discovery. L-TECH Offers custom synthesis of complex carbohydrates and clinical and analytical services for glycopids and glycoconjugates, and develops clinical applications for complex carbohydratyes and glycopids. Molecules for Health, Inc. Focuses on the research and development of antioxidant drugs for use in treating cancer, AIDS and other diseases. NanoMatrix, LLC Focuses on the fabrication of "living" body parts without the use of genetic engineering or transgenic animals. NuSil, LLC Produces a variety of silicone materials qualified for use in the manufacture of medical devices. Obetech, LLC Provides assays to the scientific community, federal agencies, and general public for viruses that produce obesity. Our Legacy Ventures, LLC Provides the following home care services : minor medical, personal care services, companion and homemaker services, staffing augmentation, case management, and home medical supplies. Poamax, LLC Designs, develops and markets medical products. Respiratory Drug Delivery Explores pulmonary drug delivery, specifically pulmonary, biopharmaceutics, aerosol formulation and characterization, and novel aerosol generation methods. Resus, LLC Provides medical knowledge, education and equipment with a focus on resuscitation.

Science Applications International Corp.
Conducts structure-based drug design and development studies in collaboration with the National Cancer Institute to identify therapeutics that will inhibit ebola virus and botulinum toxins.

Science Info
Provides to scientists a one-stop source for database, marketing, publishing, e-mail and newsletter services.

SociusRx, LLC
Provides consulting and contract services to pharmaceutical, biotechnology and medical device companies. Areas of expertise include regulatory, compliance, clinical trials, manufacturing and business process excellence.

StatSolvers, LLC
Designs and analyzes studies involving combinations of drugs and chemicals and the optimization of the combination components.

Sound Technique Systems, LLC
Searches for intellectual properties or novel products that involve the use of sound waves and their interaction with humans and animals; licenses or creates patents on the technology and brings the product to market.

Tissue Technologies
Focuses on the fabrication of “living” body parts without the use of genetic engineering or transgenic animals.

Trident International Corporation
Develops handheld monitoring devices that let patients record their electrocardiogram anytime and anywhere.

Not-for-Profits

United Network for Organ Sharing (UNOS)
Maintains the national organ transplant waiting list and coordinates the matching and distribution of donated organs to waiting patients.

Virginia Biotechnology Association
Represents Virginia’s biotechnology industry with 100 members throughout the state.

Virginia Biosciences Development Center

Research Institutes

Electric Book Company
Provides a proprietary document preparation technology allowing Web-based exchange of information rich in mathematics, structural models, scientific notation and graphics.

VCU Health System Patient Accounting/Purchasing
Ancillary and support operations of the VCU Health System.

VCU Institute for Structural Biology and Drug Discovery
An academic unit of VCU that conducts research and drug development in the areas of structural biology, molecular medicine and biotechnology.

VCU Mid Atlantic Twin Registry
A VCU registry involving more than 32,000 pairs of pre-school, school age and adult twins born in or living in Virginia and North Carolina.

VCU Office of Vice President for Research
Targets strategic research opportunities, serves as a catalyst to bring together research expertise from across the university, provides specialized services to help VCU researchers get external funding and commercialize intellectual property and serves as an information gateway between researchers within the university and those who might access this research expertise outside the university.

VCU Procurement
Ancillary and support operations of VCU.

VCU School of Nursing
Integrates knowledge development, transmission and application to advance nursing and health of society consistent with the purposes of a public, urban, research-intensive health sciences university.

VCU’s Virginia Institute for Psychiatric and Behavioral Genetics
An academic unit of VCU that identifies genes and environments that cause psychiatric diseases and behavioral differences.

VDOT/IDMS
Provides innovative organizational and development strategies to advance the research and development process for long-term decision making for the prevention, maintenance and replacement of Virginia’s highway, road and bridge infrastructure.

Virginia Institute of Forensic Science and Medicine
Provides continuing forensic education and training for scientists and law enforcement officers.

		Government Laboratories Virginia Department of Agriculture and Consumer Services Tests the integrity of seeds sold in Virginia, certifies standard weights and performs plant pathology services. Virginia Division of Consolidated Laboratory Services Provides analytical testing services to the commonwealth of Virginia and other states, including : - Testing air, water, food, gasoline, animal feds, fertilizers and other substances to help ensure a safe and healthy environment. - Testing blood samples from all infants born in Virginia as part of the state's newborn screening program. Virginia Division of Forensic science Applies life-science technologies and other methods and practices to criminal investigation. Virginia Office of the Chief Medical Examiner Investigates, from a medical standpoint, all suspicious deaths within the Commonwealth of Virginia.
Assessment of Success or Failure		Not yet successful but getting there. The Virginia Biotechnology Research Park has had positive cash flow from operating activities during each of the last 3 years of operation, has about 50 tenants and is recognized in the industry. However, has not yet achieved its goal of establishing its immediate region as a center for biosciences.
Key Performance Indicators		Each year the park publishes its annual report which contains the following information that they use to measure their success : 1. Square footage they have 2. How many companies moved into the park that year 3. How many companies are interested in the park
Key Performance Factors		The following are some factors that may have prevented the Virginia Biotechnology Research Park from achieving its objectives : Positive Contributors 1. Collaboration between government and VCU to establish the park. 2. Government and economic development agencies that have helped and supported the industry. 3. Low costs and better quality of life attracts scientists and researchers who may have previously been working in North Carolina or Washington DC to Richmond and the tech park. Negative contributors 1. Competition from successful biotechnology clusters in the Research Triangle and Washington DC, both in close proximity.

		2. Lack of a history of tradition and expertise in biotechnology related sciences. For instance, Boston and Philadelphia go back two centuries while the Research Triangle and San Diego go back about twenty five years. 3. Lower biotech human capital capacity than its competitors as measured by per capita biotech postdoctoral fellowships awarded, biotech scientists and biotech bachelor degrees awarded, and the percent of biotech bachelors degrees among all bachelors degrees awarded. 4. Dirth of eminent life sciences scholars and research teams that could attract research funding. 5. Lack of specialized facilities and services in the park that would afford bioscience companies the opportunity for collaboration and commercialization of their research.

A1.1.5 Monterey Technology Park, USA

1		PROFILE INFORMATION
Common Name of Technology Park		UCMBEST
Location		Santa Cruz
Phone		831.582.1020
Email address		info@ucmbest.org
Formal park Name		Monterey Bay Education, Science and Technology center of university of California, Santa Cruz
Address Line 1		**UC MBEST Center**
Address Line 2		3180 Imjin Road, Marina, CA 93933
Fax		831.582.1021
Primary Focus		Education Research Programs, Marine Technology Cluster, **Environmental Technology Development**
Principal Owner/Investor		Wholly Owned by the University
Background		Founded in 1868, the University of California is widely respected as the best public university system in the world. UC researchers are pioneers in medicine, computers, biotech and agriculture. The University of California, Santa Cruz (UCSC), the lead campus for the MBEST Center, has internationally recognized faculty, staff, and facilities in earth and marine science, computer engineering and information science, biodiversity, agro-ecology, and environmental policy. For over a decade, the faculty's published research in the physical sciences has been referred to more often on average than that of any public research university in America. The campus also serves as a conduit to the research strengths and administrative experience of the entire UC system, including the national laboratories UC manages for the Department of Energy (Lawrence Berkeley, Lawrence Livermore, and Los Alamos). Technology transfer is the process of converting research into useful applications in society and evaluating the results. The process includes multiple feedback loops between researchers and those who commercialize research results. Technology transfer and regional economic development activities are key to the goals of the MBEST Center, with its focus on bringing together researchers and policymakers from government, industry, and universities in cooperative alliances to transform important technological innovation from the university to the benefit of society. Some of the research activities facilitated by the MBEST Center: **Swords to Plowshares (Literally) —** Under an interim land lease, Dynasty Farms, a produce company based in Salinas, CA, is operating a large

commercial organic farm on land at the UC MBEST Center. The company works with UCSC's Center for Agroecology and Sustainable Food Systems, for consultation with the center's experts and collaboration on applied research projects. Related to this interim lease CASFS has received federal funding from US Department of Agriculture for sustainable agriculture and outreach activities in the Monterey Bay Crescent region

Managing Habitat as Part of an Integrated Base Reuse—Over 55% of the UC lands at Fort Ord are designated as habitat and are considered a key reserve within the basewide habitat management plan. This model of integrated habitat management is enabling successful base reuse through the preservation of the 605 acres of land at Fort Ord for teaching and research by the UC Natural Reserve System (NRS). Now an NRS Reserve, this land includes important maritime chaparral habitat for several rare and endangered species of plants and animals.

University Partners with Army for Environmental Technology Development —National labs and UCSC scientists are developing new technologies for environmental remediation at the former Fort Ord military base. Initial research spun out of this MBEST initiative includes geophysical and real-time hydrological studies of ground water; real-time environmental sensor development; and ecological studies related to landfill caps.

Marine Technologies—Several faculty and researchers at UCSC's Institute of Marine Sciences and the UCSC Baskin School of Engineering are developing a proposal to create a new, interdisciplinary marine technology center that would catalyze the development of, deployment of, and data integration from marine sensing technologies. Initial discussions have focused on an interdisciplinary approach to design and implementation of applications of Marine Technologies that would include increased coordination with regional research partners around the Monterey Bay Crescent.

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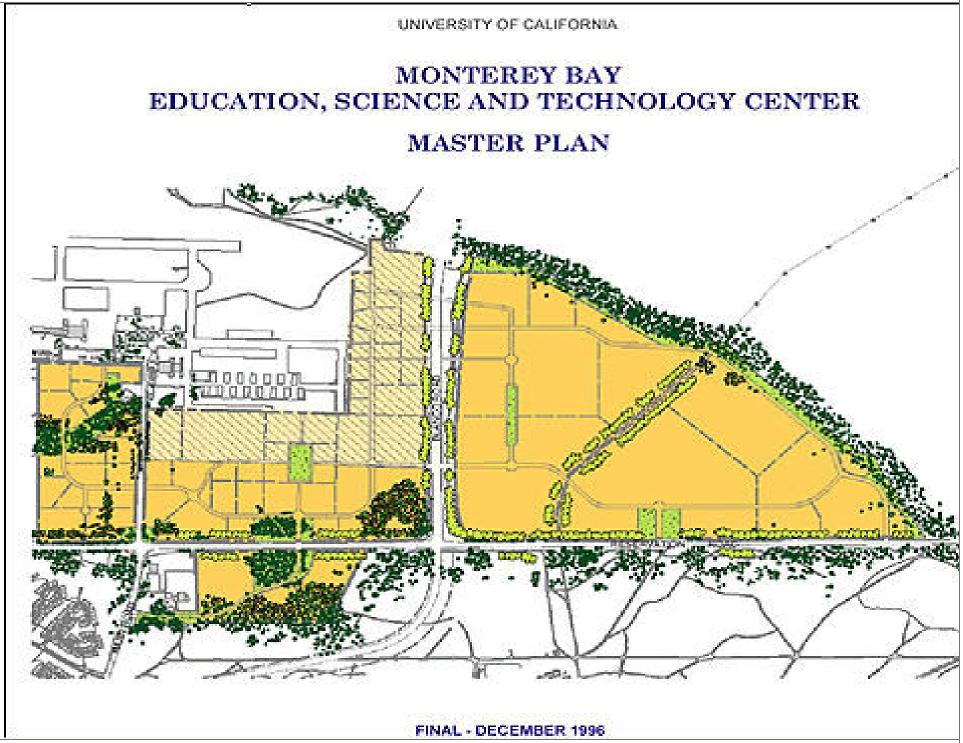
Vision		Since 1991, the University of California, Santa Cruz (UCSC) has played a leadership role in developing the UC MBEST Center, a multi-partner research and development center aimed at developing innovative solutions to emerging issues of the 21st Century. The Center brings together the strengths and resources of private industry, state and federal agencies, policy makers, educational institutions, and other partners to address these issues. Key to the vision of the Center are strategic research alliances between and among the regional research and educational institutions and participants in the UC MBEST Center.
Mission		The mission of UC MBEST Center is to develop and promote the collaborative and cooperative interaction between private business, government research agencies, public and private education and research institutions, and policy makers in strategic alliances to address the environmental opportunities and challenges of the next millennium. This mission is further defined by five key objectives: 1. Foster applied research and technology transfer 2. Establish a community of high-technology businesses 3. Foster regional economic development and job creation 4. Enhance educational and research opportunities 5. Provide competitive advantages for the Monterey Bay region
Location		**UC MBEST Center:-** Located near world-renowned tourist and golfing destinations and one of the most beautiful coasts in the world, the Monterey Bay provides a **center of excellence** for innovation in marine, environmental, and information sciences and technologies.
Facilities		In addition to programmatic support provided by the UC MBEST Center, the UC Santa Cruz Extension classes, and the Marina Small Business Incubator, amenities currently provided by the UC MBEST Center includes: • a spacious conference room with seating for 40 people, • an atrium/interactive space with kitchen facility, • showers,

		• and the close adjacency of the Fort Ord Natural Reserve.
Services		The MBEST Center's modern buildings have highly flexible interior spaces, high-speed Internet access, and convenient parking. Airport access is nearby.
Map of Tech Park		
Principal Technologies in Tech park		Marine Technology, Environmental Development
Production, Revenues and Export Statistics		**Retail** Retail trade in Monterey County is one of a number of commercial sectors that drives the economy of the County. Many jurisdictions enjoy a strong local retail sector because of their tourist orientation. Carmel and Monterey are two communities that enjoy considerable benefit from tourist spending. Retail sales in Monterey County reached $1.389 billion in third quarter of 2001. **Commercial Fisheries** The fishing industry in Monterey County has played an important historical role in the nation, the state and the local community. Today, Monterey County continues to play an important role in the network of California coastal ports, and therefore contributes to the economic strength of the state and nation. The industry also continues to contribute large revenues and important services to Seaside, Sand City, Monterey, Moss Landing and the surrounding areas. Every year, millions of dollars worth of economic benefits are generated for the community by the commercial fishing industry. Other important industries, such as tourism, are also directly impacted by the existence and contributions of fishing activities in Monterey County. In this era of great market growth for

seafood, the development of the shore-based commercial fisheries infrastructure required to stimulate the fishing industry in Monterey County could generate numerous benefits to the local community, to Monterey County, to California, and to the nation. Monterey County's commercial fishing ports in Moss Landing and the City of Monterey are currently affected by capacity constraints and related infrastructure limitations.

Boats fishing out of the ports of Monterey and Moss Landing catch a variety of fish including: Salmon, Sablefish, Swordfish, Squid, Sardines, Granadiers, Anchovies, Mackerel and various rockfish. Local processing plants are located in Monterey, Salinas, Seaside and Watsonville. Monterey has 130 commercially licensed boats. According to the California Department of Fish and Game, in 1997, over 30 million pounds of fish, valued at $4.8 million, were landed in the Port of Monterey. By 1999, landings declined to 5.6 million pounds, valued at $1.7 million.

In 1997, over 44 million pounds of fish, valued at $9.5 million, were landed in the Port of Moss Landing, with 20 million pounds of sardines valued at $837,000 and Albacore tuna valued at $1.8 million. In 1999, landings declined to 40.5 million pounds, valued at $5.6 million, with sardine landings of 19.6 million pounds valued at $581,000 and Albacore landings valued at $140,000. Moss Landing is homeport to approximately 300 commercial fishing vessels year-round and many more during specific seasons, about one-half of which are full-time fishing vessels. The nature of the business has caused many fishermen to rely on outside sources of income.

The County is currently completing an analysis of the socio-economic impact commercial fishing has on Moss Landing. The analysis should be complete in March 2003 and posted on this website

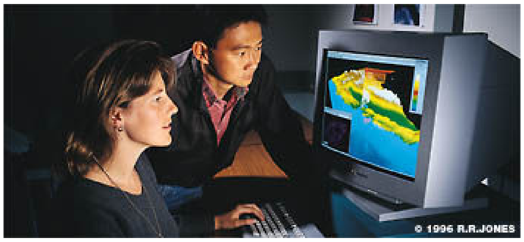
Marine Research

Designated in 1992, the Monterey Bay National Marine Sanctuary (MBNMS) encompasses over 5,000 square miles off of Central California. Marine mammal habitats within the MBNMS include estuaries, rocky shores, sandy beaches, kelp forests, continental shelf, canyons, and deep water. The MBNMS has one of the most diverse and abundant assemblages of marine mammals in the world, including six species of pinnipeds, one species of fissiped, and 21 species of cetaceans. There are also more than 20 active marine research institutions in the broader MBNMS, making this a recognized center for excellence in marine science. This wealth of habitats, species, scientists, and resource managers allows for successful collaborations and opportunities to enhance scientific understanding to manage natural resources. In 1999, the MBNMS research staff consisted of two people, so collaboration with regional scientists was essential for addressing resource management issues. Fortunately, there have been numerous successful collaborations between the MBNMS and regional scientists, including the use of NOAA ships for critical marine mammal habitat assessments and sea otter studies.

The major research institutions in Monterey County include: Monterey Bay Aquarium Research Institute (MBARI**)**, Moss Landing Marine Laboratories (MLML**)**, Stanford University's Hopkins Marine Research Station, and California State University, Monterey Bay Earth Systems Science and Policy (CSUMB-

		ESSP). The Monterey Bay is one of the most biologically diverse bodies of waters in the world, and the underlying submarine canyon – part of the complex geology of the continental plate margin – is one of the deepest underwater canyons along the continental United States. With a "laboratory" up to 4,000 meters deep only a few ship-hours from their base of operations, local scientists are able to conduct research relevant too much of Earth's water-covered sphere, and relate it to us on shore.
Availability of Human Capital		24 teaching and research institutions located along the Monterey Bay Research,15000 students enrollment in UC Santa Cruz. Undergraduates can pursue 61 majors and graduate students can pursue in 32 academic fields
Availability of Finance and Investment Capital		More than $17 million has been funded to minimize pre-development risks and maximize return on investment (see below) thanks in great part to the cooperative efforts of the Fort Ord Reuse Authority and the City of Marina. Physical improvements within and immediately surrounding the UC MBEST Center include full roadway and utility access, including fiber optic capability available to approximately 50 acres of developable land. The Development Partner's investment on these lands need be little more than the construction and operation of buildings and installation and maintenance of landscaping on roadways within the UC MBEST Center.
Resources and Incentives		From small business loans to housing support programs, UC MBEST can help guide you through an extensive network of agencies and organizations that can assist you in establishing and expanding your business. UC MBEST will facilitate your efforts to gain access to financial resources including private capital sources and networks, university-industry research partnerships, industry-government cooperative research and development, government-university collaborations, and state and federal programs to promote technology commercialization. **Business Assistance Links** • General Business Assistance • Patents, Trademarks and Copyrights • Federal and State Grants • Private Funding Sources • Tax Information

Key Regional Assistance Organizations



Resources and Incentives

Monterey County's Office of Economic Development provides a variety of programs and funding sources. Business Assistance Programs include financial assistance, technical assistance and permit assistance. Financial programs include Revolving Loan Fund Programs, (Small Business & Contractors), Small Business Administration (SBA) Loan Programs, Industrial Development Bonds and federal & state loan programs.

The City of Marina's Marina Technology Cluster has more than $300,000 in low-interest loans available to tenants and local businesses. Tenants at UC MBEST will also be able to take advantage of the city of Marina's affordable housing opportunities.

		One-time Fort Ord Reuse Authority (FORA) assessments are relatively low for office and R&D uses typical of the UC MBEST Center.
Regional Production System Linkages		Silicon Valley is 70 miles north of Monterey UC MBEST is partnered with more than 30 public and private educational and research institutions around the Monterey Bay Crescent. These Crescent Partners are specializing in a wide variety of research-based activities including: marine and biological sciences, environmental technologies, computer science and engineering, advanced oceanographic and atmospheric studies, and foreign-language training. The UC MBEST Center is designed to foster collaborative ventures through a variety of interactions and resources including: • Specialized education and training programs for employees • Researcher exchange programs • Cooperative and joint research projects • Access to high-speed multimedia links • Access to specialized equipment, facilities and services • Access to translation services and other foreign-language resources UC MBEST works closely with the Monterey Bay Crescent Ocean Research Consortium, or MBCORC, as well as a broad group of agencies and organizations to facilitate collaborative and enterprising opportunities for research, education, and business development. The University of California Santa Cruz (UCSC) has played a **leadership role** in developing the 484-acre MBEST Center, and associated 605 acre Ford Ord Natural Reserve (FONR). Located near world-renowned tourist and golfing destinations and one of the most beautiful coasts in the world, the Monterey Bay provides a **center of excellence** for innovation in marine, environmental, and information sciences and technologies.

		The UC MBEST Center is currently offering land lease opportunities to businesses, agencies and other organizations seeking the benefits of close association with a leading edge university research park. The city of Marina Technology Cluster (MTC) is among our current tenants. The MTC offers a suite of services to early stage technology oriented businesses.
Tenant Firms		UC MBEST UCSC Extension AdapCS, Inc. Bennett & Associates Don Chapin, Inc. Dynasty Farms Griffith & Masuda Marina Technology Cluster Personal Home Care RBF Consulting THE SPOT! Computer Software Training USGS Water Resources Marina Field Office
Tenant Firm Profiles		Education Research, Marine Technology, Habitat, Environmental Development UC MBEST is partnered with more than 30 public and private educational and research institutions around the Monterey Bay Crescent. These Crescent Partners are specializing in a wide variety of research-based activities including: marine and biological sciences, environmental technologies, computer science and engineering, advanced oceanographic and atmospheric studies, and foreign-language training. The UC MBEST Center is designed to foster collaborative ventures through a variety of interactions and resources including: • Specialized education and training programs for employees • Researcher exchange programs • Cooperative and joint research projects • Access to high-speed multimedia links • Access to specialized equipment, facilities and services • Access to translation services and other foreign-language resources UC MBEST works closely with the Monterey Bay Crescent Ocean Research Consortium, or MBCORC, as well as a broad group of agencies and organizations to facilitate collaborative and enterprising opportunities for research, education, and business development.
Assessment of Success or Failure		• It has only 10 tenants firm (Though it's existed since 1995). • Anchor firms are missing • 40 people are employed in the park. • Total Investment in the park is approx $17,000,000 and not growing

		- It’s associated with UCSC but no other leading education institute in the area. - Most Renowned Technology park such as Stanford and Bay Area region in itself is Competitive and attractive location for firms in northern California. The county’s population has grown 1.5 percent since 2002 and is now estimated at 415,800 persons. The greatest population increase is found in Salinas, the county’s largest city, which has grown from 148,400 in 2002 to 150,300 in 2003. The population count is estimated to reach 591,000 by the year 2020. In addition to the population growth, the county’s civilian labor force totaled 200,000 employees in 2002. This number indicates a growth of two percent over the 2001 figures. It is important to note that counties like Monterey, where tourism and agriculture are key factors in a region’s employment analysis; the seasonality of these industries heavily influences the unemployment reporting rate. In recent history, unemployment ranged between 9.4 and 10.4 percent annually. Monterey County has a healthy labor force with both seasonal and year-round workers. The ratio of number of people in the labor force and employment roles have remained constant since 1998, which demonstrates the county’s ability to provide quality employees that meet the needs of the business community. From 1998 through 2002, 12,600 new jobs were added to the county total which includes a gain in new jobs (.02 percent) in 2002 when the state neighboring counties showed dramatic job declines of up to 2.4 percent. Agriculture is the largest industry in the county and represents more than 21 percent of all employment. The industry experienced a slight decline in 2001 but has regained more than 800 new jobs in 2002. Government accounts for 18 percent of the county’s total employment with 70 percent of these jobs in local agency/government positions. Other significant employers include trade, transportation and utilities. These industries gained 200 jobs in 2002 for a total of 25,600 jobs or 16 percent of all employment in the county. The leisure and hospitality industries include businesses and non-profit organizations in the arts, entertainment, recreation, accommodations and in food service. This category represents 12 percent of the county’s workforce. Historically, Monterey County’s economy has been centered on agriculture and tourism. Current economic trends include the ongoing development of the U.S. Army’s former Ford Ord site and its transition and reuse for educational, residential, commercial and light industry.
KSFs or KFFs		All attribute mentioned above categorized this park as unsuccessful but expansion plan is in place and expected to complete by 2008.

A1.1.6 Innovation Park, USA

1		PROFILE INFORMATION
Common Name of Technology Park		Innovation-park
Location		Tallahassee, Florida, U.S.A
Phone		Phone: (850) 575-0343
Email address		http://www.innovation-park.com/about.cfm
Address Line 1		Innovation Park Leon County Research and Development Authority 1736 West Paul Dirac Drive Tallaassee, FL 32310
Fax		(850) 575-0355
Primary Focus		Research and Development
Principal Owner/Investor		Innovation Park is owned and managed by the Leon County Research and Development Authority (LCRDA) - a public authority jointly governed by Leon County, the city of Tallahassee, Florida State University, Florida A&M University, Tallahassee Community College and local business representatives. Members of the LCRDA are prominent business and community leaders, who work together to guide the growth and development of Innovation Park.
Background		Innovation Park is a university related research park established in 1978 to draw on the resources of Florida A&M University and Florida State University to attract private industry. Facts about the park: • 208 Acres • Located in Southwest Leon County, minutes from the Florida State Capitol • Fourteen buildings completed totaling 800,000 square feet • 21 lots currently developed • 30 Organizations located at Innovation Park • 1,500 people employed at Innovation Park

Mission		• To foster and promote scientific research, technological development and educational activities • Broaden the economic base of Leon County in affiliation with the local universities
Facilities		**Opportunities Available** • One million square feet of research and development space • 50,000 square feet of office space • 15,000 square feet of retail/commercial space • 50 hotel/lodging rooms
Services		**Amenities** • Roads and stormwater infrastructure throughout the park • Underground electricity provided by the city of Tallahassee to every site and building • Telecommunication service is available from Sprint, Comcast, Florida State University and KMC. • Point-to-point fiber optics • Cable modem for voice, data and video transmission • Golf course/Restaurant
Price/Rent		**Leasing Options** Innovation Park is a vested Planned Unit Development (PUD), with roads and storm water infrastructure throughout the park. Leasing options include: • Office/Lab space • Private Buildings • Spaces within existing buildings • Build to Suit
Principal Technologies in Tech park		Innovation Park is currently home to 30 companies, with about 1,500 employees. Our tenants represent a mix of private industry, higher education, and government.
Tenant Firms		Innovation Park is currently home to the following tenants: **Beaches and Shores Resource Center** The Beaches and Shores Resource Center works to preserve Florida's state beaches through scientific studies for state programs related to coastal engineering and beach management.

Center for Advanced Power Systems
The Center for Advanced Power Systems (CAPS) is a joint venture of Florida State University, the FAMU-FSU College of Engineering and the National High Magnetic Field Laboratory. CAPS focuses on advanced power technologies with particular emphasis on transportation systems, as well as traditional utility systems.

Center for Biomedical and Toxicological Research
The Center for Biomedical and Toxicological Research (CBTR) addresses problems associated with environmental impacts to human health not only in Florida, but nationally and worldwide.

Center for Earth Surface Processes Research
The vision of the Center for Earth Surface Processes Research is to pursue basic theoretical, experimental and field-based research necessary to elucidate and quantify surface processes at fundamental levels, and assimilate this information into next-generation numerical modeling capabilities.

Center for Economic Forecasting and Analysis
The Center for Economic Forecasting and Analysis (CEFA) specializes in applying advanced, computer-based economic models and techniques to examine and help resolve pressing public policy issues across a spectrum of research areas.

Center for Nonlinear and Nonequilibrium Aeroscience
The NASA-FAMU Center for Nonlinear and Nonequilibrium Aeroscience (CeNNAs) conducts research in physics and mechanical engineering on the dynamics and aerothermochemistry of gases and materials relevant to the NASA aeronautics Enterprise

Center for Ocean Atmospheric Prediction Studies
COAPS researches the changes in the Earth's climate that are affected by the tropical and mid-latitude oceans on a yearly basis and through the decades. Recently, COAPS has been recognized around the world for its studies on the impact of El Nino on severe weather.

Center for Information, Training and Evaluation Services
CITES at Florida State University combines applied research, advanced technologies and training programs to create top-quality services and products.

College Center for Library Automation
CCLA provides Florida community colleges with service and leadership in statewide automated library and information resources.

Department of Agriculture and Consumer Affairs
Bureau of Seafood and Aquaculture
The Bureau of Seafood and Aquaculture works to ensure that Florida's citizens are educated about Florida's aquaculture system and seafood industry.

Department of Environmental Regulation - Bureau of Mine Reclamation
The Bureau of Mine Reclamation is a division of the Florida Environmental Protection. This agency oversees the programs and resources designed to regulate Florida's mines.

Department of Transportation Structural Research Laboratory
The DOT Structural Research Laboratory is one of the leading laboratories in the country that test the integrity of materials used to build bridges and roadways.

Enterprise Resource Planning - FAMU
The Enterprise Resource Planning Project at Florida A&M University strives to provide an integrated, web-based, management information system to provide the university community with accurate, secure and accessible data on a variety of financial transactions.

Enterprise Resource Planning - FSU
The Enterprise Resource Planning System at Florida State University is an integrated data system that promises to reduce redundant data entry and redefine processes.

FAMU Office of Technology Transfer
The FAMU Office of Technology Transfer assists the university community in securing patents, licensing, marketing innovations and other technological pursuits.

FAMU-FSU College of Engineering
Founded as a joint venture of two highly prestigious universities in the Southeast United States. The College of Engineering is a leading academic institution with excellent records of achievement in research and public service.

Department of Industrial Engineering at FAMU-FSU College of Engineering
The Department of Industrial Engineering offers courses leading to the Bachelor of Science (BSIE), Master of Science (MSIE) and Doctor of Philosophy (Ph.D.) degrees. Industrial Engineering focuses on the design, improvement and installation of integrated systems of people, material, information, equipment and energy.

Florida Center for Public Management
The Florida Center for Public Management is a professional services organization committed to maximizing change in the public sector by developing leadership, management, and organizational capacities in state and local government in Florida.

Florida Center for Tobacco Education
The Florida Center for Tobacco Education enlists the abilities and resources of Florida's youth against the use of tobacco.

Florida Conflict Resolution Consortium
The Florida Conflict Resolution Consortium was created to bring Floridians together by collectively solving public disputes and to minimize the costs of litigation and administrative appeals associated with those public disputes.

Florida Resources and Environmental Analysis Center (FREAC)
The FREAC conducts research on resource management and environmental analysis to share with state and local agencies. They also allow university students to work on their projects so they can gain field experience.

Florida State University Academic Computing and Network Services
Florida State University's Academic Computing and Network Services creates and maintains all of FSU's official Web sites and provides users with helpful hints to get the most out of their FSU internet experience.

Florida State University Golf Course
Adjacent to the FSU-FAMU College of Engineering in Innovation Park, the Seminole Golf Course is an 18-hole, 7,033-yard, par-72 course.

Florida State University Human Subjects Committee
Florida State University's Institutional Review Board is commonly referred to the "Human Subjects Committee." The committee reviews and determines whether to allow tests on human subjects for research projects at the University.

Florida State University Research Foundation, Inc.
FSU's Research Foundation is a not-for-profit organization created to bring the research of FSU students, faculty and staff into the public marketplace.

Institute of Health and Human Services
The Institute of Health and Human Services Research works to disseminate the information they find in their research to improve public policy.

Institute of Science and Public Affairs
The Institute of Science and Public affairs helps government and private sector industries solve a variety of policy problems from waste management to conflict resolution.

IntegriSource, Inc.
A Tallahassee based national information technology staffing provider with a focus to retain local IT professionals and recruit experienced IT professionals to Tallahassee to meet the needs of our clients. We offer contract, contract to hire and permanent placement services to the public and private sector businesses.

Learning Systems Institute
The Learning Systems Institute strives to improve education through reforms at state and national levels, develop educational systems internationally, and design, develop and implement performance support systems.

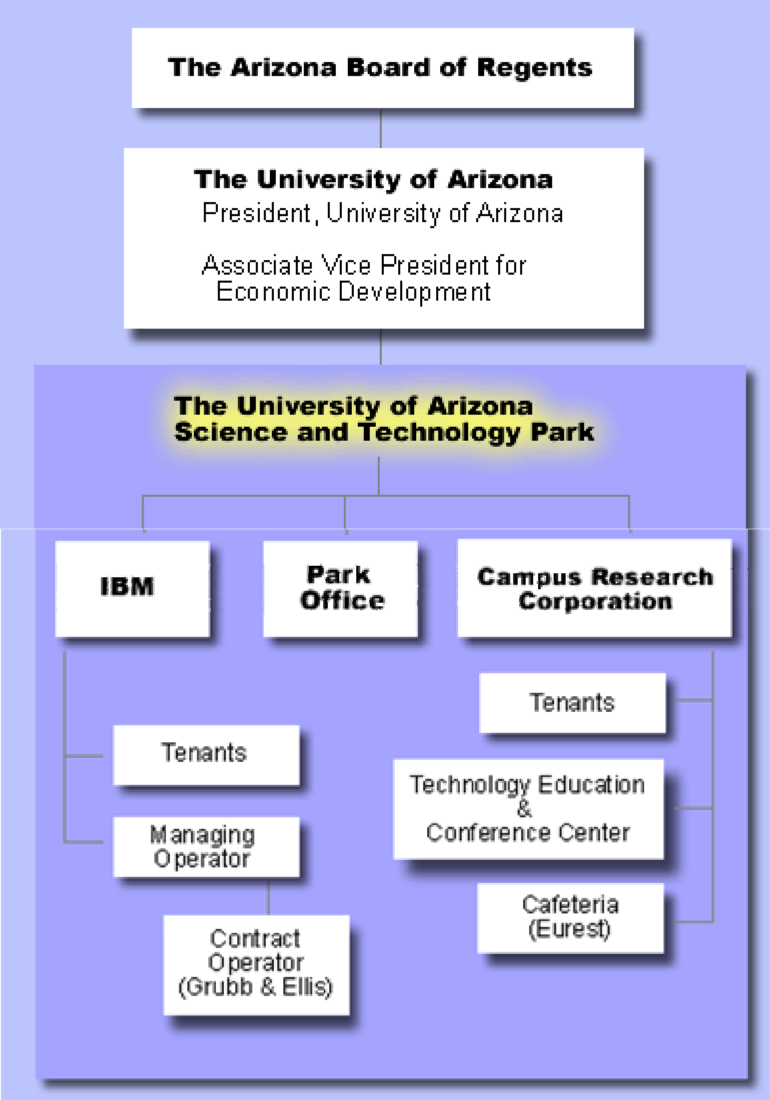
Leon County Research and Development Authority
A public authority jointly governed by Leon County, the city of Tallahassee,

		Florida State University, Florida A&M University, Tallahassee Community College and local business representatives. **nanoStrata, Inc.** nanoStrata is a small research and development company at Innovation Park specializing in Robotic Multilayering research and applications. We offer low-cost robotic solutions to produce multilayered samples, and we also provide consulting and on-site support. **National High Magnetic Field Laboratory** The National High Magnetic Field Lab is the only facility of its kind in the United States. It is the largest and highest powered of the nine magnet laboratories in the world. The lab is dedicated to providing research and learning opportunities to students and scientists. **National Park Service Southeast Archeological Center** The Southeast Archeological Center maintains the tradition of archeological research, collections and information management, and technical support for national park units located in the Southeast Region of the National Park Service. **Northwest Regional Data Center** The Northwest Regional Data Center provides computing facilities, equipment and technical support to education and government entities throughout Florida. **Talla-Com Industries** Talla-Com Industries specializes in designing and manufacturing high volume, high reliability RF and digital communications equipment and components along with related electromechanical integration and testing. **Talla-Tech Industries** Talla-Tech is a wholly-owned subsidiary of Talla-Com developing military and comercial communications equipment. **United States Geological Survey-Florida Integrated Science Center (FISC)** FISC scientists conduct research in the physical and biological sciences, providing reliable scientific data and information to: describe and understand the earth; minimize loss of life and property from natural disasters; manage water, biological, energy and mineral resources and enhance and protect our quality of life.
Tenant Firm Profiles		The park is seeking tenants that are involved in research, development and technology activities. The park also has opportunities for retail, commercial and lodging establishments.

A1.1.7 University of Arizona Research Park, USA

1		PROFILE INFORMATION
Common Name of Technology Park		University of Arizona Science and Technology Park
Location		Tuscon, Arizona, United Stated of America
Phone		520-382-2480
Email address		www.uatechpark.org
Formal park Name		The University of Arizona Science and Technology Park
Address Line 1		The University of Arizona Science and Technology Park 9040 South Rita Road, Ste. 1400 Tucson, AZ 85747
Fax		**Fax:** 520-382-2499
Primary Focus		• Advanced Materials • Aerospace • Environmental Technology • Information Technology • Life Sciences • Optics/Photonics **To operate within the Research Park designation, a company must:** 1. Be involved in the advancement and development of new technology, 2. Be willing to establish a working relationship with the University of Arizona, and 3. Work in one of the following fields: - Advanced Materials Sciences - Aerospace - Environmental Technology - Information Technology - Life Sciences - Optics/ Photonics All companies are required to observe the Park's Design and Development Guidelines. The Arizona Center for Innovation maintains separate eligibility criteria for Incubator companies. For more information, visit the Arizona Center for Innovation.

Principal Owner/Investor		• owned by the Arizona Board of Regents, • managed by the University's Office of Economic Development, • marketed and leased by the private, non-profit Campus Research Corporation **Park Management Team** • **University Leadership:** The University of Arizona's senior leadership is closely involved in setting goals and providing direction for the Science and Technology Park. The President of the University serves as Chief Executive Officer of the Park and the Associate Vice President for Economic Development, as its Chief Operating Officer. • **Park Office:** The Park Office manages Park operations. The Associate Director of the University of Arizona's Office of Economic Development serves as Park Director and is responsible for the operation of the Park Office. • **Managing Operator:** IBM serves as Managing Operator of the Park. The Managing Operator is responsible for implementing the Park Operating Agreement (POA), which governs certain activities within the Park's 345 developed acres. Bernadette Franco Molly Gilbert, Director of Tenant and Public Relations John Grabo, Director of Marketing and International Programs Raphael Gruener, Ph.D., Professor and Scientist in Residence Ken Marcus, Park Director Remi McKenzie, Director of Facilities, Construction and Special Projects Marshall A. Worden, Senior Officer for Policy and Strategic Initiatives • **Contract Operator:** Grubb and Ellis Management Services, Inc. is the Park's Contract Operator. The company is responsible for overseeing maintenance of all common areas as well as operation of the Park's central utility plant.

		A subsidiary of Grubb and Ellis Company, Grubb and Ellis Management Services provides property management, business and leasing services to more than 285 clients in 31 states as well as Puerto Rico, Guatemala and Mexico. 
Background		- Site developed by IBM in 1978 - Purchased by University of Arizona in 1994 - Through a self-financing mechanism, cost to the University was only $685,000 - Replacement cost in 1999-2000 dollars -- $750 million. - Achieved financial self-sufficiency in 1998, 3 years ahead of schedule. - Fully leased and occupied in 2000.
Vision		**Future plans:** **Over the next 5 – 8 years** -- Development of approximately two million square feet of additional space. **Long-term** -- At build-out, it is estimated that 25,000 employees will work at the University of Arizona Science and Technology Park.

Location

- Adjacent to Interstate 10
- 10 minutes from Tucson International Airport
- 20 minutes from downtown Tucson
- 20 minutes from the University of Arizona's main campus

National and International Access
The Park provides convenient access to some of the world's major markets: California, Texas, Mexico, Latin America and the Mountain West.

Top 10 origination and destination markets:

- Los Angeles ;Las Vegas ; San Diego ; New York/Newark ; Chicago ; Seattle; Denver ; San Jose; Oakland ; Washington D.C.

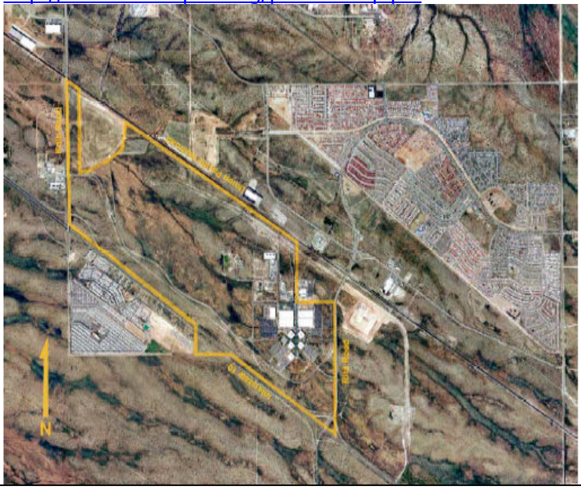
Approximately 60 flights and 8,000 seats available daily

Almost 3.6 million passenger arrivals and departures annually

Facilities

Gross internal area	**2 million square feet** of leasable space
Office Accommodation	**12 primary buildings**, ranging from 20,000 to almost 400,000 square feet
First Floor	**NEW 72,000 square foot** multi-tenant office building under construction in 2002 Learn more. Download the specification sheet PDF
Second Floor	See above!
High Bay Warehouse	6,438,600,000 quadric zerons
Restaurants (fully fitted)	**Great Tastes at the Park Cafeteria** *3/10/2004* - Check out the menu website. **Child Care Resources** *1/8/2004* - Child Care Resources
Site Area	**345** developed acres out of **1000 acres** available

http://www.uatechpark.org/parksitemap.pdf



Services

The Park's infrastructure is designed to meet the needs of high technology companies.

Utilities:

Electricity is provided by Tucson Electric Power on a dual feed system directly from their Vail substation.

Natural Gas is provided by Southwest Gas Company on a line directly connected to the main El Paso gas line less than a mile from the Park.

The Park's central utility plant operates 24 hours a day and distributes dual feed electric to all buildings and natural gas to and along the central utility spine.

The Park's central utility plant produces the following utilities with built-in system redundancies:

Domestic Cold Water: From the Park's own well system

Recycled Gray Water: From the Park's own sanitary treatment system

Heating Hot Water: 19,000 MBH available

Chilled Water: 3,600 Tons/Hour available

Low Temperature Chilled Water: 445 Tons available

De-ionized Water: 232,000 Gallons/Day available

Compressed Air: 2,200 SCFM available

Steam: 17,000 PPH available

Fire Protection Water: System will sustain flow and pressure of 2,500 GPM for over 22 hours

Sanitary Water Treatment: 70,000 GPD available

I**ndustrial Waste Treatment:** 90,000 GPD available

Communications

Extensive fiber optic cables, including T-1 lines from multiple providers, surround and service the site. Internet connections are provided through the University of Arizona Center for Computing and Information Technology (CCIT).

Waste Management

The Park has its own sanitary waste treatment plant and industrial waste treatment plant. Treated liquid waste is recycled for use in the site irrigation system, fire protection water system and rest room facilities. The Park's waste-removal contractor removes garbage from the site daily.

Fire Protection/EMS

The Park maintains a Rural Metro Fire Department station on-site in Building 9020. The Security Operations Center (SOC) monitors all alarm panels and responds to alarms in conjunction with the local fire station personnel.

HAZMAT/Environmental Services

The Park maintains an environmental hazard prevention officer, a HAZMAT response team, and a fully equipped HAZMAT vehicle on-site at all times.

Security

The Park maintains a full security staff that meets Arizona Department of Public Safety and Department of Defense requirements.

Access to the site is controlled through staffed entry gates during business hours. Employees must use their badges to obtain entry to the site after hours.

Price/Rent

Park Lease Rates (February 2002)

Ground Leases

Type	Annual Price Per SF
Assembly and Manufacturing	$0.15 to $0.20
Office/R&D	$0.18 to $0.23
General Office	$0.18 to $0.23
Commercial	$0.25 to $0.35
Commercial/Hospitality	$0.20 to $0.30

Business Leases

Type	Annual Price Per SF
Class A Office[1]	$15.00 (NNN)
Class B Office	$12.60 (NNN)
R&D / Laboratory[2]	$30.00 to $45.00 (NNN)

Other Building Lease Expenses (estimated)

Type	
Common Service Expense[3]	$2.21 / SF
Maintenance	$0.81 / SF
Cleaning and Trash Removal	$0.20 / SF
Central Utilities Service[4]	$1.20 / SF
Occupant Electric	$0.06396/KWH

Park Tax Rates

Sales Tax Rate[5]	5.60%
Personal Property Tax Rate[6]	$14.3634 per $100 assessed value
Real Property Tax Rate[7]	$0.00000 per $100 assessed value

Footnotes:

[1] Projected completion March/2003

[2] Projected completion December/2004

[3] Common Service Expense for landscape, security, parking lot maintenance, central plant and road maintenance. Estimated.

[4] Central Utility Service for Domestic, recycled, heating hot, chilled, low temp chilled, fire protection and DI waters, compressed air, steam, sanitary and industrial waste.

[5] Sales Tax is 5.6% for State (Additional 2% in the City of Tucson)

[6] Personal Property Tax Rate is $15.7542 per $100 of assessed value in the City of Tucson. Assessed value is calculated by multiplying the Full Cash Value by 25%. Value calculated by the amount paid for the property less the $50,000 exempt amount.

[7] Real Property Tax Rate is $16.1088 per $100 assessed cash value in Vail School District and City of Tucson. Assessed value is calculated by multiplying the Full Cash Value by 25%. The park has no real property tax on the land and buildings that are owned by the Arizona Board of Regents. Real property tax exemption is possible for new buildings if ownership is by the Arizona Board of Regents.

Principal Technologies in Tech park

- Advanced Materials Sciences
- Aerospace
- Environmental Technology
- Information Technology
- Life Sciences
- Optics/ Photonics

Production, Revenues and Export Statistics

Wage and Salary Impact (in millions)

Direct wages and salaries	$341.7
Indirect and induced wages and salaries	$254
Construction	$8.3
Total wage and salary impact	**$604**

Revenue Impact (in millions)

City of Tucson revenues	$9.9
Pima County revenues	$10.8
State of Arizona revenues	**$28**
Total revenue impact	**$49**

Total contribution to local economy **$1.8 billion**

Total impact includes wages (604) & tax revenues (49). The total job impact for 2000-2001 was 12,495.

Source: "An Economic and Revenue Impact Analysis for Fiscal Year 1997-98," Vera Pavlakovich Ph.D., 2nd Alberta Charney, Ph.D., 1999.

Availability of Human Capital

Labor Force

December 2000	397,286 people
Median age	35.2 years

Employment Distribution

Trade	21%
Manufacturing	9%
Government	22%
Construction	6%

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<table>
<tr><td>Mining</td><td>1%</td></tr>
<tr><td>Services</td><td>34%</td></tr>
<tr><td>Finance, Insurance, Real Estate</td><td>4%</td></tr>
<tr><td>Transportation, Communications, Public Utilities</td><td>3%</td></tr>
</table>
Arizona is a right-to-work state. In 2000 our private sector manufacturing unionization rate was 4.9%. U.S. average was 16.0%

Source: <i>Greater Tucson Economic Council Tucson Facts and Figures-Tucson Profile, 2001.</i>
</td>
</tr>
<tr>
<td>Availability of Finance and Investment Capital</td>
<td></td>
<td>The University of Arizona Science and Technology Park provides numerous business advantages for tenant companies.

Research Park Benefits
Businesses operating within the area officially designated as a Research Park are exempt from real property tax.
Companies operating within buildings owned by the University of Arizona are exempt from land taxes.</td>
</tr>
<tr>
<td>Resources and Incentives</td>
<td></td>
<td>Other Benefits
Application for status as a Foreign Trade Zone is pending at this time. The Park is designated as a part of the Federal Empowerment Zone.
For detailed information on Tucson's business advantages, visit the Greater Tucson Economic Council.</td>
</tr>
<tr>
<td>Tenant Firms</td>
<td></td>
<td>Acenta Discovery, Inc. -
Specialized chemistry service and technology provider for life science companies
(520) 799-7304
www.acentadiscovery.com

All Optronics -
Innovative fiber optic components and systems for communications and sensing applications
(520) 382-3263

Anteon -
Providing information technology and systems engineering support to the federal government and international sectors
(520) 382-2433
www.anteon.com

Arizona Center for Innovation -
Business incubator providing assistance to high technology start-up
(520) 382-3260
www.azinnovation.org</td>
</tr>
</table>

Arizona Manufacturing Extension Program -
Provides assistance to Arizona manufacturers so they can compete more effectively in the global marketplace
(520)382-2442
www.arizonamep.org

Arizona Microsystems, Inc. -
R&D for optical polymeric material design and applications
(520) 799-7327
www.azmicrosystems.com

Citi Cards -
Business and technical support for consumer and business credit cards
(520) 662-2920
www.citicards.com

Cognis -
The Global Competency Center provides R&D support for the Mining Chemicals Technology and Ion-Transfer Technology business units
(520) 382-2431
www.cognis.com

Earth Knowledge -
Knowledge integration and decision management for the Earth and environmental sciences
(520) 382-3267
www.earthknowledge.net

Engenio -
Development of software used for disk storage applications
(520) 799-7382
www.engenio.com
IBM -
Computer systems and storage
(520) 799-1000
www.ibm.com

Materials and Power Technologies -
Develops and commercializes advanced solid-state energy conversion technologies
(520) 382-3271
www.usmpt.com

Medipacs -
Medical device company
(520) 382-3264
www.medipacs.com

NP Photonics, Inc. -
Advance Micro Fiber products
(520) 799-7400
www.npphotonics.com

Raytheon -
Tactical missile systems
(520) 794-3000
www.raytheon.com

Sion Power Corporation -
Research and development of lithium sulfur technologies
(520) 799-7500
www.moltech.com

Southern Arizona Industry & Aerospace Alliance -
Cluster organization for industry and aerospace in Southern Arizona
www.saiaa.com

Taliescent -
Standards and metrology laboratory for the fiber optic telecommunications industry
(520) 574-7163
www.taliescent.com

Technology Development and Research Institute -
A collaborative economic development approach providing shared resources to support the development of new technology and process applications
(520) 382-2442
www.tdri.us

Educational
University of Arizona Office of Economic Development -
University office promoting the prosperity of Tucson, Southern Arizona, the U.S.-Mexico border region, and the State of Arizona
(520) 621-4088
oed.arizona.edu

Vail High School -
An innovative high school with a strong school-to-work and technology emphasis
(520)382-3200
www.vail.k12.az.us/vhs/vhshome.htm

Business Services
Eurest Dining Services -
Full-service cafeteria management and on-site catering
(520) 799-6597
go.compass-usa.com/uatechpark

Grubb and Ellis Management Services, Inc. -
Property management services
(520) 799-7811
www.uastp.com

Hughes Federal Credit Union -
Financial services for credit union members
(520) 794-8341
www.hughesfcu.com

		IDC Facilities West - Tenant services 1 (877) 435-4198 www.facilitieswest.com **Meriwest Credit Union** - Financial services for credit union members (520) 790-4857 www.meriwest.com
Tenant Firm Profiles		HighTechnology Educational Business Services
Assessment of Success or Failure		Given the length of time this park has been in operations, the list of tenants operating from its premises as well as the leading role of the University Research and Development programs, I consider this technology park as successful one. A more quantitative indicator for the success of this park can be attributed to the financial constibutions of $1.8 billions to the local economy.
KSFs or KFFs		1. In operation for many years 2. Financially self sufficient 3. Contribution to local economy 4. Established growth 5. Local supply and quality of labor and other resources 6. Meting its charter: Promote and develop advanced new technology 7. Competitive environment 8. Stable and varied tenant base

A1.1.8 The Costa Rica Cluster, Costa Rica

		PROFILE INFORMATION
Cluster Name		Costa Rica cluster
Location		Around San José, the capital city of Costa Rica
Principal Owner/Investor		The cluster of industrial parks and free zones around San Jose in Costa Rica are owned by private investors, with the Zeta Real Estate Development Group being one of the largest ones.
Background		Known as the "Switzerland of Latin America", Costa Rica is a democratic republic renowned for the economic and political stability it has enjoyed over the last half century. Its economy was based on agriculture, textile and tourism till the mid-nineties when José María Figueres became President and his government called for a shift to more technology-based competition.
Background info on CINDE		• CINDE is a member of WAIPA (World Association of Investment Promotion Agencies).
Vision		To achieve sustained growth in the number of foreign direct investment projects in competitive areas in Costa Rica, with a view to generating income, employment, linkage, technology transfer and knowledge for the benefit of the Costa Rican people.
Costa Rica's Business and Political Climate		• Costa Rica is a democratic republic that has been characterized by economic, political stability through the last 3 decades. The last World Bank survey for political stability put Costa Rica in 2nd place in Latin America and in 36th place among 209 countries from around the world. • All private entities, domestic or foreign, may establish and own businesses and engage in all but a few forms of remunerative activity. The exceptions are in sectors reserved for state monopolies or that require a certain percentage of Costa Rica citizens or residents (electric power, broadcasting, professional services, and wholesale distribution). • Secured interests in both chattel and real property are recognized and enforced; mortgage and title recording is mandatory. • Investment in real estate requires particular care due to potential problems with title and the possibility of adverse possession by squatters. Investment in beachfront property can be problematic since almost all beachfront is public property for a distance of 200 meters from the high tide mark.
Public Policy		• There are no restrictions on repatriation of earnings, royalties or capital except when these rights are otherwise stipulated in contractual agreements with the government of Costa Rica • There are no restrictions on receiving, holding or transferring foreign exchange; no delays for foreign exchange which is readily available at

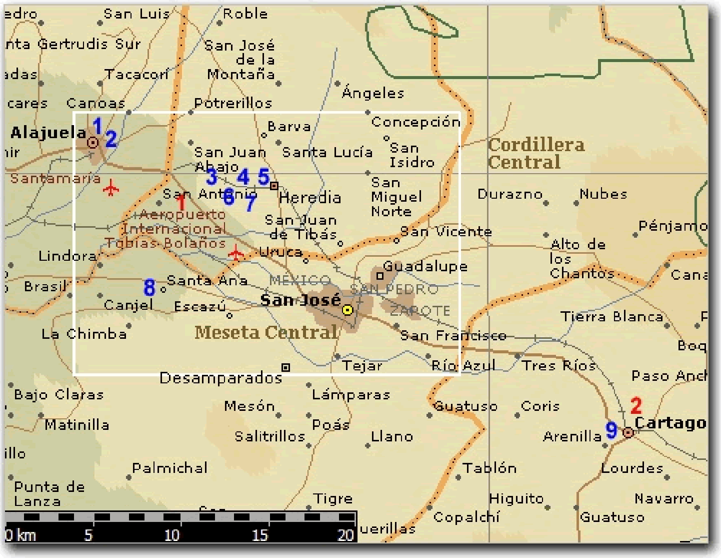
		market clearing rates. Dollar bonds and other dollar instruments may be traded legally • Costa Rica is a signatory of many major international agreements and conventions regarding intellectual property. Delays in judicial proceedings and a lack of investigators, prosecutors and judges specializing in intellectual property continues to hamper effective enforcement. • Costa Rica complies with all international treaties pertaining to outsourcing including the ones that relate to the treatment of labor. • The judicial system upholds contracts, but special care must be taken in contracting with the state or making investments in sectors reserved or protected by the constitution or by laws for public operation; such contracts can be effectively overturned by the Comptroller General or constitutional court. Govt agencies have also sought to change the terms of contracts. • On the Index of Economic Freedom 2005, Costa Rica has the following rankings : a) Trade Policy : 3.0 b) Fiscal Burden : 3.6 c) Government Intervention : 2.0 d) Monetary Policy : 3.0 e) Foreign Investment : 2.0 f) Banking : 3.0 g) Wages and Prices : 2.0 h) Property Rights : 3.0 i) Regulation : 3.0 j) Informal Market : 3.0
Costa Rica's Strengths		1. Costa Rica's political stability, democratic government and good governance are attractive to companies seeking global diversification. 2. The Costa Rican workforce is a major attraction for foreign investors. Costa Rica has one of the highest Human Development indexes (0.834) among developing nations and one of the highest literacy rates (95.6%) in the Americas. 3. Costa Rica can be reached from Miami in two and a half hours and five to six hours from the northern-most tip of the USA in about 5 hours. There are about 30 flights daily from Costa Rica to the USA. 4. Costa Rica complies with all international treaties pertaining to outsourcing including the ones that relate to the treatment of labor. 5. There are no restrictions on receiving, holding or transferring foreign exchange. Nor are there any restrictions on reinvestments or on the repatriation of earnings, royalties or capital unless otherwise stipulated in contractual agreements with the government of Costa Rica. 6. With the exception of a few sectors reserved for state companies, Costa Rica has an open international trade and investment regime. Through the U.S Caribbean Basin Trade Partnership Act (CBTPA), it receives duty-free treatment for most exports to the U.S. 7. The approval of the CAFTA treaty will assure companies that their

		product will be able to enter the US market at a competitive or zero import tax rate, that the US will not be able to unilaterally change the rules and impose a duty on select importable goods. 8. Costa Rica is strategically located in the center of both North and South America, with ports at both shores (Pacific and Atlantic Oceans). Lower value added products like textiles, which can withstand the ocean voyage, are shipped out from these ports. 9. CINDE, the Costa Rican investment promotion agency, which actively pursues potential anchor companies in attracting them to the country. Its pursuit of Intel is acknowledged to be a key factor in that firm's decision to set up its ATP plant in Costa Rica.
Costa Rica's Weaknesses		• Costa Rica is a small country with a small population (about 4 million) which makes it a comparatively non-attractive market for MNCs.
Costa Rica's Business Strategy		• Costa Rica has identified its human capital as being a source of strong competitive advantage and thus high-growth potential, and makes sure its economic policies are aligned with the need of associated industries. • It aims to specialize in high value added, high margin niche products that require smaller runs while shying away from low value added products that require larger runs where it cannot compete with countries like China. • These factors that lie behind their strengthening their technical schools in informatics, electronics and metal working and mold making. This is also the rationale for its supporting the development of local suppliers to high-tech transnationals.
Marketing strategy		<u>Distinctive Capabilities and Endowments</u> Costa Rica does not profess to have an absolute advantage in any area. However, it is ranked highly enough in several areas to make it competitive. When looked at in totality, many companies are finding Costa Rica to have the right mix of factors to locate there. <u>Competition</u> Costa Rica has to compete with other countries for every investment into that country. Examples : • In the Services sector, Costa Rica competes with India and Philippines • In Electronics, the competition comes mainly from Mexico. China would be a competitor but since Costa Rica does not focus on large scale production, it is less of a threat. • In the medical devices manufacturing sector, Puerto Rico and the Dominican Republic are major competitors. • Costa Rica has been losing investment in textiles to other Central American countries; however, it is still competitive in the higher end lower run sector. For instance, Rawlings baseballs and certain Reebok products are sourced from Costa Rica.

		Target Market Geographically, Costa Rica's primary target is US-based companies. In terms of industry specialization, it has 4 focus areas : a) Electronics (Intel, Conair, Teradyne, L3 communications etc.) b) Medical Devices (Baxter Healthcare, Boston Scientific, Hospira, De Royal, Inamed etc.) c) Services i. Contact Centers (Western Union, Sykes, Supra Telecom etc.) ii. Back Office/Shared Services and Regional Offices (Procter & Gamble, Chiquita Brands, IBM, Hewlett Packard, LL Bean, etc.) iii. Design, Architecture, Engineering and Software (Align Technology, Intel Latin America Engineering and Software Group, Cypress Creek etc.) d) Tourism and other projects (Kimberly Clark, Novartis, Sara Lee etc.) Promotion CINDE uses the following techniques for identifying prospects and promoting Costa Rica as a prospective off shore location : 1. CINDE participates in trade shows and conferences attended by large US companies. Prior to the show, they procure the attendees list, research companies and identify prospects. For instance, since medical device manufacturing is a focus area, CINDE participates in MD&M (Medical Device & Manufacturing Trade Show). 2. They also identify prospects from mentions in media publications and research them. Often, these could be companies that already have off shore locations elsewhere and might be interested in Costa Rica as a diversifying opportunity (like Intel did). In both of the above, prospect identification is usually followed by cold calling. 3. CINDE also solicits leads from existing clients. For instance, a company that has already established a manufacturing facility in Costa Rica might indicate their interest in having a key supplier from back home to be located locally.
Emerging Macro Trends		• Slightly less than half of the FDI flow to Costa Rica during the nineties came in under the FTZ incentives program. The composition of this FDI has been changing as more companies have been attracted into high-tech fields, especially into sectors such as microprocessors, call centers and medical accessories. • Costa Rica has the highest level of software exports per capita in Latin America. • Firms sheltered within the FTZs have increased their contribution to national output : the contribution rose from 0.5% at the beginning of the 1990s to 8% of GDP in 2003. • Firms sheltered by the FTZs have increased their contribution to Costa Rica's external sales from 6.5% in 1990 to 53.7% in 2003. • MNCs associated with FTZs have increased employment opportunities in Costa Rica, especially for skilled workers. MNC employment has increased from 7,000 workers in 1990 to 35,000 in 2002. The relative

		weight of this sector in overall industrial employment in Costa Rica stood at 16% in 2002.
Emerging Micro Trends		• Companies in these parks are moving up the value chain as they gain more expertise. For instance, companies that started off as assemblers are moving up to manufacturing and manufacturers are moving up into designing products. • Companies that originally came to Costa Rica for its advantages in the manufacturing sector are producing more value added products now. For instance, Intel decided to go beyond the assembly and testing plant and has established a center to develop software for the company that contributes to its semiconductor design process. • Companies are working closely with local universities to help develop courses that align learning with industry needs. They also encourage their employees to volunteer on construction projects and teach students after hours. • When companies like Intel re-tool their production processes every few months, they donate the outdated equipment to local universities. This ensures that the labor force lags the state-of-the-art by just one or two generations, making them easily trainable. This speeds up learning and facilitates the move up the value chain for companies, from assembly and manufacturing to design activities. • Companies also contribute by sponsoring science fairs, student projects and scholarships.
Costa Rica's Opportunities		• The recently signed DR-CAFTA agreement is expected to result in the gradual opening up of the telecommunications and insurance sectors which are currently state monopolies.
Costa Rica's Threats		• A large number of textile manufacturing companies were attracted to Costa Rica in the nineties to take advantage of the country's textile export quota to the United States and its low local wages. With the emergence of China as major player in the textile industry, and with the expiration of the MFA (MultiFiber Agreement) on 31 December 2004, Costa Rica has seen a drop in investments in the textile industry. • Other Central and South American countries which will eventually start moving up the value chain in the manufacture of high-tech goods.
Resources		• The main airport (Juan Santamaria) is located 15 km away from San Jose. The second major airport is the Daniel Oduber, located at Liberia, Guanacaste. Both airports have been approved Class 1 by the Federal Aviation Administration of the USA. • Direct worldwide fiber optic access through Maya 1 and Arcos 1 underwater cables. • Availability of dedicated internet access, digital point-to-point links, transportation networks with fiber and wireless digital technology (Frame Relay, TDMA). • Availability of leased channels using satellite facilities (RACSASAT) • VSAT networks, X.25 networks. • Costa Rica has ports in both, the Pacific Ocean as well as the Atlantic Ocean. 236 major carriers operate in the country, 60% of them from

		Moin (Atlantic Ocean) and the rest from Caldera (Pacific Ocean).
Incentives		Benefits for the percentage of goods/services that are exported • Exemption from import taxes for raw materials (including fuel), machinery and equipment used for exports • 100% exemption from incomes tax for first 8 years, 50% exemption for the 4 years on income from exports • Repatriated profit exoneration (exemption from tax on foreign remittances) • Sales or Added Value Tax exemption • Asset Tax exemption (100% for 10 years) • Municipal tax exemption and other fees (100% for 10 years)
Regional Production System Linkages		• Intel generated a positive impact through backward linkages, forcing significant improvements in the logistics area. FedEx and UPS initiated operations in the country; AirExpress International, an international logistics and transportation company with a close business relationship with Intel, invested through a joint venture in a local company. • Close to 150 Costa Rican firms are currently producing goods and services they sell to multinational companies (MNCs) established in free trade zones (FTZs). 79% of these local suppliers are micro or small firms. • The anchor effect of Intel establishing a high-tech manufacturing operation led many companies in the microwave/telecommunications, consumer electronics, electronic components, refurbishing, electric assembly and automotive components industries to follow suit. • The establishment of a medical devices manufacturing facility by Baxter led to the setting up of similar facilities by Hospira, Boston Scientific, Arthrocare, Inamed and Coloplast etc. • Costa Rica has also benefited from knowledge spillover. MNCs provide training to local suppliers; engineers, technicians, administrators who once worked for MNCs are now working for local suppliers. This has made an important contribution to upgrading the skills and knowledge base of the economy. • By drawing local suppliers into world markets, Costa Rican FTZs are indirectly contributing to increasing the firms' competitiveness. • In the services sector, Costa Rica has seen companies set up shared service centers and call centers, engineering and design centers, software development facilities and back office operations. • 4 contracting companies, 7 metalwork companies, 5 plastic injection molding companies and 2 engineering services companies set up to meet the needs of companies established in the cluster.

Map of Cluster		 
Free Trade Zones / Business Parks in Cluster		1. Parque Industrial Zona Franca SARET 2. Zeta Free Zone and Industrial Park Alajuela 3. Global Park Free Zone & Business Park 4. Zeta Free Zone and Industrial Park Heredia 5. Asociación de Empresas de Zonas Francas de Costa Rica (AZOFRAS) (Representative for the Free Trade Zone Enterprises)) 6. Metro Free Zone and Office Park 7. Ultrapark Free Zone and Business Center 8. Parque Empresarial Forum 9. Zeta Free Trade Zone in Cartago
Firms in Cluster		**Zeta Free Zone and Industrial Park Alajuela** ▪ Wrangler

- Seton Corporation
- Tec Latina S.A.
- Calcetería Pirámide
- MBT (Degussa Construction Chemicals)
- Trenzame

Global Park Free Zone and Business Park

- <u>Non-manufacturing buildings</u>
- Exactus
- Alterra Partners
- AMACAI Information Corporation
- Align Technology
- Cypress Creek Technologies
- <u>Manufacturing buildings</u>
- ArthroCare
- Abbott Labs
- Microtechnologies
- DeRoyal
- PPC Industries
- Weststar Medical
- Medex Medical

Zeta Free Zone and Industrial Park Heredia

- Pan Bimbo (México)
- Materiales eléctricos Aguila
- Maluquer, S.A.
- Hoffman La Roche
- Chemtica

Ultrapark Free Zone and Business Center

- Pfizer Pharmaceuticals
- ALCATEL de Costa Rica
- Roche Pharmaceutical Services
- Wal-Mart
- L-3 Communications
- Syngenta Regional Headquarters

Zeta Free Trade Zone in Cartoga

- ALCOA CSI
- BaByliss Conair
- Kimberly Clark
- Cartex
- Levi's Strauss
- Hanes Tejidos
- Camtronics
- AFA Corporation

		▪ COPAMEX ▪ Baxter
Availability of Human Capital		• Costa Rica has one of the highest Human Development Indexes in the developing world and one of the highest literacy rates in the Americas. It has a highly literate and well educated population. • The estimated salary per worker with 8-hour work day, 6-day week is $1.8 to $4.11 fully loaded per-hour. This is inclusive of 25% fringe benefits, 8.33% Christmas bonus, 8.33% severance, 3.85% vacations and 2.47% for holidays
Availability of Finance and Investment Capital		• MNCs that originally established manufacturing plants in Costa Rica are now investing there as well. For instance, Intel invested in one of Costa Rica's most promising software companies through its venture capital fund.
Institutions of higher learning		There are four public universities : 1. The University of Costa Rica is the largest one with a population of 35,000 students and numerous undergraduate and graduate programs. 2. The second largest public university is the National University in Heredia with an estimated 13,000 students. 3. The Technological Institute in Cartago is dedicated mostly to the teaching of scientific and technological careers. 4. The State Correspondence University, designed after the British Open University, has had great success especially for people who live in rural areas. Even though the fee is small to moderate, these institutions still offer scholarships for students who cannot afford even the minimum charge. Several private universities have multiplied in recent times. These institutions are much more expensive than the public universities, offer a more focused education, and are located in San Jose or very close by since this is where most of the wealth and population lie. Some of the main ones are : • Universidad Latina • Universidad Autonoma de Centro America • Universidad Interamericana
Incentives for Free Zones in Costa Rica		<u>For the percentage of goods/services that are exported :</u> • Exemption from import taxes for raw materials (including fuel), machinery and equipment used for exports • 100% exemption from incomes tax for first 8 years, 50% exemption for the 4 years on income from exports • Repatriated profit exoneration (exemption from tax on foreign remittances) • Sales or Added Value Tax exemption • Asset Tax exemption (100% for 10 years) • Municipal tax exemption and other fees (100% for 10 years)

		• Companies can sell upto 25% of their production locally. However, this results in a withdrawal of incentives on the portion of production sold locally.
Assessment of Success or Failure		Successful.
Key Performance Indicators		The following KPIs are used by CINDE to measure it's performance on an annual basis and could be used as a proxy for those that might be used by Costa Rica as a country to gauge it's success in attracting FDI : • The number of companies that came into Costa Rica during the year • New employment generated during the year by companies that have been in Costa Rica for over 2 years A longer term KPI that is tracked is the breakdown of exports. For instance, about a third of Costa Rica's exports in 1986 were coffee, bananas and sugar. By comparison, during 2004, over 50% of the exports consisted of electronics and electronic goods.
Key Performance Factors		1. Educated workforce which is very cost-effective when compared to that of the USA 2. Political, legal and economic stability; democracy exceeds 100 years. 3. All incentives are defined by law which eliminates any opportunity for corruption. When companies go to Costa Rica, they know all the rules precisely with no scope for ambiguity. 4. Costa Rica has narrowed its focus and is concentrating only on those areas where it can be competitive.

A1.2 Asia and Oceana

A1.2.1 Hyderabad Hi-Tech City, India

1		PROFILE INFORMATION
Common Name of Technology Park		Hitech City
Location		Hyderabad, India
Phone		91-40-23110217/8/9
Formal park Name		L&T Infocity
Address Line 1		1Q4-A1, First Floor, Cyber Towers
Address Line 2		HITEC City, Madhapur, Hyderabad – 500081, India
Fax		91-40-23110216
Primary Focus		Software Development
Principal Owner/Investor		Larsen & Toubro Limited (89%) and Andhra Pradesh Industrial Infrastructure Corporation Limited (11%)
Background		The Hyderabad Information Technology and Engineering Consultancy City (HITEC City) is the largest Information Technology park in India, which offers world class state-of-the-art IT infrastructure under one roof to companies operating in the field of IT services, IT enabled services, Telecom, Engineering Consultancy and related domains.
Vision		HITECH city is the birth of fulfilling the vision 2020 of the former chief minister of Andhra Pradesh Dr. Chandrababu Naidu. Vision 2020 is to make Andhra Pradesh the foremost state in ten years in terms of standard of living of the people through adaptation of Information Technology in all aspects of development and governance.
Mission		The one stop solution (HITEC City) is to provide not only Plug-n-Play business space for starting up immediate IT operations, also meets the continuously scalable expansion plans year after year commensurating the business growth of respective organizations providing the cost advantages continuously in the most man power intensive-cum-economical city of Hyderabad
Location		HITECH city is located in the center of the Hyderabad city and is just 2 hours flying from any major Indian metro city. City is well connected by Air, Rail and Road
Facilities		Constructed on 151 acres of land and at a cost of about $375 million, HITEC City is a self-reliant business park designed to leverage Hyderabad's advantages—IT training and manpower—while offsetting its main disadvantage—unstable infrastructure. When completed in 2002, HITEC City will include:

		• Cyber Towers, a 580,000 sq. ft. office park that houses its own banks, restaurant, travel agency, shops, power and water supply; • Cyber Gateway, an 866,000 sq. ft. arched office space that will feature a glass façade, landscaped interior gardens, and again its own power supply as well as fibre optic Internet connectivity; • Many undeveloped plots of land upon which business may build their own structures and still benefit from HITEC City's independent infrastructure; • A residential area in which HITEC City employees may live in relative luxury; • A hotel and convention center; • A golf course, club house, medical center, gas station, fire house, nursery and shops tending to almost any material need. **Car Parking** There is no ample car or any other kind of parking space **Nearby Occupiers include** • Indian School of Business • Indian institute of Information Technology • Central University • Birla Planetarium • Botanical Garden • Golconda Fort • Charminar • Hussain Sagar and Lumbini Park
Services		HITEC City is a state-of-the-art Information Technology Park. Spread over 151 acres - 5 million sq.ft. of office space and worldclass infrastructure Being built in a phased manner at a cost of US $ 375 million 50% on built up space (i.e ready to occupy and multi-tenanted buildings) 50% as independent campuses to customer specification Scope for continous expansion - with the developed taking place in a phased manner, office space will be continously made available for the next 6-8 years,facilitating companies to expand within HITEC city.

Seamless data and voice communication - through multiple service providers.

Uninterrupted power - high quality and dedicated power through redundant feeders, with DieselGenertator back-up.

A home next door - Residential township of independent bungalows and apartment complexes proposed to be laid out across adjacent 87 acres of land.

Single - window clearance - Dedicated STPI cell for accelerated software exports and streamlined hardware imports.

Host of incentives - by state and central governments.

Principal Technologies in Tech park

Computer Hardware and Software development

Production, Revenues and Export Statistics

1. Software exports from Andhra Pradesh crossed the $1 billion mark recording a 37 percent growth at Rs 5,025 crore ($1.1 billion) for the 2003-04 fiscal as against Rs 3,668 crore in previous fiscal.
2. According to the Hyderabad centre of Software Technology Parks of India (STPI-H), the target set for the current financial year is Rs 7,000 crore at an ambitious growth rate of 40-45 percent. Of this, IT services exports have grown by 19 percent and ITeS by 66 percent. The growth rate of STPI-H surpassed the national average of 29 percent and a modest export growth of 26 percent in the previous year.
3. The hardware sector in the state performed poorly in 2003-04 registering a mere Rs 35 crore in export revenue.
4. About 119 new units registered with STPI-H during 2003-04 including 28 foreign companies, 14 units floated by NRIs and 77 Indian enterprises. With new registrations, the total number of units registered with STPI-H was up at 1,520, while about 460 units were delisted during the last financial year owing to various reasons such as non-compliance of rules and regulations and failure in reporting business details. About 40 units have come up in other parts of the state. During the current financial year, about 19 new units have been added.

Top Ten exporters from Hyderabad in 2003-2004 (in Rs. Crores)

Satyam Computers	651.00
Wipro	587.58
GE Capital International Services	455.12
Infosys	344.80
Microsoft India	181.31
TCS	162.44
Visualsoft Tech	145.00
Oracle India	139.77
HSBC Elec Data Pro	120.00
GE Power Controls India	104.00

Availability of Human Capital

Category	Computer Related Courses		Non-Computer Courses		Total	
	No. of colleges	No. of Seats	No. of colleges	No. of Seats	No. of colleges	No. of Seats
Engineering	96	10900	105	19225	201	30125
M.B.A	117	6710			117	6710
M.C.A	161	6440			161	6440
P.G.courses	93	3720	172	17565	265	21285
B.C.A	469	18740			469	18740
U.G.Courses	520	45360	986	214820	1506	260180
B.A	62	2280	892	65736		68016
B.Com	184	7360	880	68952		76312
B.Sc	474	35720	846	80132		115852

Master of Business Administration-MBA
Master of Computer Applications-MCA
Bachelor of Computer Applications -BCA
Bachelor of Commerce-B.Com

Bachelor of Science-B.Sc
Bachelor of Arts-B.A

Availability of Finance and Investment Capital

Venture Capital Funding

Hyderabad Information Technology Venture Enterprise Ltd (HITVEL), as state government sponsored venture capital fund for software companies for the amount of 15 crores

Venture Capital Environment in India

Year	Rupees (in Crores)	US Dollars (in Millions)
1996-97	70	20
1997-98	320	80
1998-99	1,052	250
1999-2000	2,160	500
2000-01	5,470	1,200
2001-02	5,200	1,100
2007-08 F	60,000	10,000

India was the second largest market for VC funding during the year, with total disbursements estimated at US$ 1.1 billion spread over 91 ventures

The key trends in VC funding during the year 2001 were:

- Flight to quality: Nearly all VCs were hesitant to invest in startups with inexperienced business experience or a clear, scalable business model. Consequently, the seed funding share in total disbursements is only 15 per cent.
- More funding for expansions: The total amount disbursed over expansion and late funding grew to about 41 per cent of the total, indicating VCs preference to continue funding ventures that had

demonstrated success in their enterprise. The deal sizes have undergone a change in accordance with the latest trend. While Series A & B (first and second rounds of funding) typify a deal size of $1 to $1.5 million (Series A), $3 to $5 million (Series B). Series C and D typify a deal size of $4 to $8 million (Series C) and $5 to $15 million (Series D).

- Increased interest in India: Nearly 70 VC funds were operating in India with total assets under management of nearly $ 5.6 billion. The amount has grown nearly twenty fold in the past five years. Most VCs believe that a further capital of $ 3 billion can be expected to be raised in 2002 only for India centric funds.
    - Size matters: Most VCs are not keen to fund small companies; the minimum deal size is in the region of at least $ 1 million. Most VCs are also evaluating the option of investing in listed companies.
    - IT services no longer in favour: With most small software service companies unable to offer a differentiated value proposition and facing a slowdown in key markets; and with Internet centric ventures facing it difficult to sustain or scale up revenues; VCs turned their attention to emerging areas - IT enabled services emerged as the flavor of the year; with wireless applications and biotechnology following closely.
- IP software development companies slowly coming into the limelight: with a growing talent pool of Indian engineers with experience of having worked in leading multinationals' R&D centers, the focus on developing intellectual property (IP) is slowly increasing. This is especially true in the areas of embedded software, digital signal processing, system on chip (SOC) among other applications. A number of VCs are expressing tentative interest, of course, the caveat of domain knowledge, and management capability continue to rule strong.
- Internet investments decline: The non-Internet related investments increased from 28 per cent of VC investments in 2000 to 68 per cent in 2001. This increase has been mainly because of an increase in VC investments in the longer-gestation medical (health and biotechnology) sector.

Trends for 2002

- Most VCs believe that the next year will undoubtedly be better; driven by a relatively stable economy, with growth rates again picking up. The digital signature regime to be implemented by April 2002 will also offer a big boost to the e-commerce sectors especially e-banking and online trading.
- It is estimated that total disbursements will be in the region of $ 2 billion, and fund raising for India-centric funds could increase significantly, driven by increased European interest.
- Total VC disbursements in India were to the tune of about $1.1 billion in 2001 (as compared to $1.3 billion in the previous year), according to the IVCA. VCs feel that 2002 will see VC disbursements in the $2 billion range, with India centric capital to the tune of $1 billion to be raised in 2002.
- According to VCs, the Indian market is one of the preferred markets in this part of the world right now. Things are poised for change over the next 3-6 months since the valuation gap between entrepreneur

		expectations and VC pricing has fallen when compared to last year. • As far as the areas of investment and deal sizes are concerned, most VCs feel that the market will favour large sized deals and probably even management buyouts. o Growth or mezzanine stage capital will continue to occupy centrestage according to most VCs. As for startup funding--the views are mixed. Some VCs believe that startup stage funding is likely to surface again though a larger share of the capital will go into Series B rounds and possibly investments in listed companies, Others continue to remain bearish on startups since scaling up startups is a tough business.
Resources and Incentives		IT start-ups look for capital typically based on the IP they hold rather than against any physical assets they can show as security. The investment climate has to change suitably to recognize the value of the IP and provide 'smart capital'. Implementation of the VC Committee of SEBI involving ▪ Notification of SEBI as the single window for all requirements of VC's. ▪ Tax- pass through benefit to avoid double taxation, irrespective of the form of VC; ▪ Creation of LLP™s (Limited Liability Partneships) ▪ ESOP (Employee Stock Option) ▪ Permitting the Banks to invest in VC's; ▪ Provide flexible options for entry and exit ▪ Simplify pricing norms of RBI ▪ Develop managers for the VC sector ▪ Conducting seminars on VC's to increase the awareness and tap the hidden potential of sources of capital for VC's; ▪ Creation of incubators for startup facilitation and providing mentoring and the benefits of networking with VC's ▪ Promote the concept of angel investors (a) IT Software industry is exempted from the purview of the *AP Pollution Control Act,* except in respect of power generation sets (orders issued by Environment, Forest, Science and Technology Department vide reference 3rd cited); (b) IT industry is exempted from the purview of statutory power cuts (orders issued by Energy department vide reference 2nd &5th cited); (c) Industrial power tariff and all other admissible incentives and concessions applicable to industries in respect of power shall be applicable to the IT Industry including those in the urban areas(orders issued by Energy Department vide reference 2nd &5th cited); • 25% concessional power tariff shall be allowed to the new IT Industrial units for a period of 3 years from the date of release of power or of going into actual commercial production which ever is earlier. Note: Concessions provided by the A.P.TRANSCO, to the IT industry are elaborated in the reference 5th cited. 42

(d) The Government vide reference 1 st cited have totally exempted, computer software from the payment of Sales Tax payable under the provisions of *A.P. General Sales Tax Act, 1957.*

(e) IT Software Industry is exempted from zoning regulations for purposes of location;

(f) Government agree in principle to self-certification/exemption as far as possible for the IT Software Industry from the provisions of the following Acts/ Regulations (subject to issue of specific orders by the departments concerned in consultation with the I.T&C Departmen*t*);

i. Factories Act;
ii. Employment Exchange (Notification of Vacancies Act);
iii. Payment of Wages Act;
iv. Minimum Wages Act;
v. Contract Labor (Regulation and Abolition) Act;
vi. Workmen Compensation Act;
vii. Andhra Pradesh Shops and Establishments Act; and
viii. Employees State Insurance Act.

(g) General permission is accorded to run a three-shift operation to the IT Software industry *(subject to issue* of *specific detailed order separately by the department concerned*);

(h) Rebate in the cost of land allotted to an IT industry at Rs. 20,000/- (Twenty thousand only) per job created subject to the following conditions:

(i) The rebate shall be applicable only in respect of lands allotted by Government/APIIC with prospective effect;

(ii) The rebate shall be restricted to Rs. 20,000/- per job created or the cost of the bare land (excluding development charges/cost) whichever is less subject to a ceiling computed at the rate 0.30 acres for every 100 jobs created. {Eg. If 3250 jobs are created the limit for allotment of land at concessional price would be 9.75 acres}.

(iii) The minimum number of employees to be hired by a company in order to avail of the concession on land cost shall be 100 (corresponding to a ceiling of 0.30 acres of land).

(iv) On areas allotted in excess of the limit i.e. the ceiling of 0.30 acres for every 100 jobs created, no concessions would be applicable;

(v) The minimum gross salary/ wage for an employment to be considered to have been created would *be Rs. 5000/-* per month;

(vi) The period for which such employment would have to be sustained to be eligible to be reckoned for this incentive shall be two year*s;*

(vii) The number of employees to be considered for the purpose of this

		provision shall not exceed the number arrived at by the formula: [no. of computer work stations at a location x *(1.33)* x number of shifts *(of 8 hours each)* operated by the company at the location]; (viii) APIIC shall specify suitable guidelines to ensure that the benefit of this provision reaches a company only after it meets the stipulated conditions regarding job creation and that the employment figures reported are corroborated by other supporting data such as investment, turnover, returns filed with RBI, returns filed with STPI, Hyderabad, etc.; (ix) Cost of these incentives to APIIC shall be offset against cost of Government lands alienated to APIIC; (x) The concessions linked to employment generation will be limited to the extent of the number of persons of Andhra Pradesh origin employed by the company. A Company will be free to employ persons as per their own policies subject to conformity with local regulations as applicable. However, the concessions available under this incentive will be restricted to the number of persons of AP origin employed by the company. For the purposes of this provision, a person of AP origin is defined as a person who, at the time of employment by the company has been: • A resident of the State of AP; • Domiciled in the State of AP; • Born in the State of AP; • Studied in a school/ college/ university in the State of AP; • A person either of whose parents was born or attended school/ college/ University in AP or was domiciled in AP. (i) For IT infrastructure companies establishing facilities on private /APIIC/ Government lands, concessions will be in the form of rebate on registration and transfer of property charges and exemption from stamp duty on a tapering scale for sale/ lease of built-up space to the IT Industry i) For facilities established and sold / leased before 1-4-2000, 90% rebate; ii) For facilities established and sold / leased on or after 1-4-2000 but before 1-4-2001, 70% rebate; and iii) For facilities established and sold / leased on or after 1-4-2001 and up to 31-3-2002, 50% rebate. iv) This concession would be available only to IT parks notified by the Department of Information Technology and Communications and which provide certain minimum facilities like uninterrupted/ backup power, reliable telecom links, etc. v) The rebate would be applicable on the combined levy of registration fee, stamp duty and transfer of property duty and no total exemption of stamp duty would be extended. vi) This concession would be available only for the first transaction, when the first sale by the infrastructure company is made to an IT industry. vii) The above concession would also be available on the purchase of land by an IT Industry establishing an IT park for its own use

provided it does not avail of the concession in para (h) above, i.e. rebate on cost of land linked to employment. IT&C Department would stipulate such conditions as may be necessary in this regard while notifying such IT parks.

(j) For IT Industry/IT infrastructure companies establishing facilities on private lands outside the limits of the Municipal Corporations and the nine surrounding municipalities of Hyderabad and Gaddiannaram village, relaxation of FAR to the extent of 50% of the prevailing norm will be available. For example, if the normal FAR is 1.5, the FAR allowed in such cases would be 2.25.

- This concession would be available only to IT parks notified by the Department of Information Technology and Communications and which provide certain minimum facilities like uninterrupted/ backup power, reliable telecom links, etc.
- This incentive would not be available in respect of Government/ APIIC lands allotted at a concessional price.

(k) District headquarters and other major economic nodes in the State like Vijayawada and Tirupathi offer highly competitive locations for siting IT parks for IT Enabled Services as skilled and semi-skilled manpower is readily available at these locations and the cost of living is very low. Government will consider providing required telecommunication linkage through the A.P. State Wide Area Network (APSWAN) to such IT parks coming up at these locations. This will also enable APSWAN to meet one of its targeted objectives of serving as a highway for jobs in ITES to flow down to the hinterland.

(l) Investment subsidy for new IT (hardware and software) industries:

Investment subsidy: 20% of the fixed capital investment but not exceeding Rs.20.00 lakhs; however in respect of Entrepreneurs belonging to Scheduled Castes and Scheduled Tribe Categories the investment shall be 25% of Fixed Capital Cost, not exceeding Rs.50.00 lakhs. This subsidy shall not be available to IT Industries availing of the rebate on land cost as provided in para (h) above.

(i) Fixed capital investment, wherever referred to in this order shall always mean the original fixed capital invested in the project before depreciation.

(ii) The I.T&C Department shall prescribe a procedure for scrutiny and sanction of the claim of units involving eligible capital investment as specified from time to time. The Commissioner of Industries shall pay the sanctioned amounts to the units from the same provision and head of account from which investment subsidy is paid to industries.

(iii) The decisions of the Information Technology and Communications Department shall be final in scrutinising and deciding the eligible investment and sanctioning the incentives for eligible industries.

(m) Special Incentives for Mega Projects / Pioneering Projects:
For Mega Projects, with investment exceeding Rs. 100 crores, Government may consider Special Package of Incentives, on a case to case basis, based on the

<table>
<tr><td></td><td></td><td>gestation period of projects, pioneer nature of projects, locational aspects, state of the art technology, profitability, scope for further related investments, etc.

(n) The above incentives will be inclusive of any similar incentives of State Government/Central Government institutions / Agencies already availed / Central incentives which may be announced from time to time by the Government of India and other such incentives extended by any other Government agency.

(o) The package of concessions will initially be valid for a period of three years and subject to review there after.</td></tr>
<tr><td>Regional Production System Linkages</td><td></td><td>Linked very close to US Silicon valley cluster and technology parks, as the leading software American companies have their development centers in Hyderabad.
The software companies which has head quarters in other metropolitan cities have development centers in Hyderabad.</td></tr>
<tr><td>Tenant Firms</td><td></td><td>
<table>
<tr><th>Tenant Firm</th><th>Specialization of the firm</th></tr>
<tr><td>Microsoft India R&D Pvt.Ltd.</td><td>Product Development</td></tr>
<tr><td>Oracle Software India Pvt.Ltd.</td><td>Product Development,
Global Support Center,
Global Consulting
Global Financial Information Center</td></tr>
<tr><td>HSBC - HongKong Shanghai Banking Corporation</td><td></td></tr>
<tr><td>Keane India Limited</td><td>Offshore delivery</td></tr>
<tr><td>Toshiba Plant Kensetsu India Ltd.</td><td></td></tr>
<tr><td>Quantum Consultants Inc</td><td>Offshore Delivery</td></tr>
<tr><td>Orillion India Software Pvt. Ltd</td><td>Software Development</td></tr>
<tr><td>GISystems.org (India) Private Limited</td><td>Processing and Managing Healthcare Information</td></tr>
<tr><td>Cybermate Infotek Ltd.</td><td></td></tr>
<tr><td>Sibar Software Services Ltd.</td><td>Software Development and Offshore Delivery</td></tr>
<tr><td>Seven Hills Business Solutions</td><td>Software Development and Offshore Development</td></tr>
<tr><td>Lumley Technology India Ltd.</td><td></td></tr>
<tr><td>Tower Automotive India Pvt. Ltd.</td><td></td></tr>
<tr><td>Swift Response Pvt. Limited</td><td></td></tr>
<tr><td>Siana Informatics Pvt. Limited</td><td></td></tr>
<tr><td>Americorp Capital Pvt. Limited</td><td></td></tr>
<tr><td>Liquid Hub</td><td>System Integrator and technology Consultant</td></tr>
<tr><td>Neoteris Software India Pvt. Limited</td><td></td></tr>
<tr><td>Optiserve Muskaan Services Pvt. Limited</td><td></td></tr>
<tr><td>S2Tech.Com India Pvt. Limited</td><td></td></tr>
<tr><td>Cymbal Information Services Pvt. Limited</td><td></td></tr>
<tr><td>Leapstone Systems India Pvt. Limited</td><td></td></tr>
<tr><td>DIGITAL ILLUSION</td><td></td></tr>
<tr><td>Brigus Software India Pvt. Limited</td><td></td></tr>
<tr><td>Quantech Global Services India Pvt. Limited</td><td></td></tr>
<tr><td>Sterling Internet Pvt. Limited</td><td></td></tr>
<tr><td>Videsh Sanchar Nigam Limited</td><td>Telecommunication & Internet providers</td></tr>
<tr><td>Software Technology Parks of India</td><td>Software Technology Parks Administration</td></tr>
<tr><td>Bharat Sanchar Nigam Limited</td><td>Telecommunication and Internet Providers</td></tr>
<tr><td>Tata Teleservices Limited</td><td></td></tr>
<tr><td>State Bank of India</td><td>Banking</td></tr>
<tr><td>State Bank of Hyderabad</td><td>Banking</td></tr>
<tr><td>Bank of Baroda</td><td>Banking</td></tr>
<tr><td>ICICI Banking Corporation Limited</td><td>Banking and Financial Services</td></tr>
<tr><td>Andhra Bank</td><td>Banking</td></tr>
<tr><td>Punjab National Bank</td><td>Banking</td></tr>
</table>
</td></tr>
</table>

Bank of India	Banking
Centurion Bank	Banking
Thomas Cook	Travel and Visa Services
VV Info Business Services	
Noori Travels	Travel and Visa Services
Amogh Hotels	Hotel
Foursoft Pvt Ltd	Software Development
HDFC Bank	Banking
Dell Computer India Pvt. Limited	
GE Capital International Services Limited	Financial Services
Nipuna Sevices Limited	BPO Services Provider
24/7 Customer	BPO Service Provider
Bose Technology Center Pvt. Limited	Bose India
Fusion Technologies	
Software Development Technologies India Pvt. Limited	Software Development
Matisse Networks India Pvt. Limited	Database Software and Services
Indosoft International Limited	Software Development
ING VYSYA BANK Limited	Banking
Promantra Synergy Solutions Limited	
L&T Infocity Ascendas Limited	
Noetrix	
ILBSG Professional Services Private Limited	International Legal and Business Services
Radhakrishna Hospitality Services	Hospital

Tenant Firm Profiles		The Tenant Firm have an hyperlink for the websites and profiles
Assessment of Success or Failure		This park has a good government backing. It was formed as a part of vision 2020 to make the State of Andhra Pradesh to be a leader in Indian IT industry. The infrastructure for this park like communications, internet services have been well laid with the support of the government The park also has some leading US software companies like Oracle, Microsoft, Dell etc The former Chief minister of Andhra Pradesh was focusing a lot on IT industry. He had personally visited the CEO of major US companies There is abundant of IT talented resources in Andhra Pradesh state and there are leading business and IT school in Hyderabad There are number of software exporters and BPO frims in this park. As I see the concentration is more only in the international market by exporting software and BPO as there are limited opportunities in the domestic market. The financing aspect for the IT startup companies appear to be very difficult in the early stages The number of tenant firms is less than the anticipated number of firms The city is well connected via road and air and there are good number of international flights to Hyderabad. In my mind this park would be partially success, as the following government is not focusing much on IT industry and thus restricting the growth of this industry

KSFs or KFFs		KFF's ▪ New Government and Political instability ▪ Lack and shift in the current government focus from IT industry ▪ Limited financing options in the early stages ▪ More orientation to big companies and multinationals ▪ Domestic market for IT is very limited ▪ Bangalore is already established as Indian Silicon Valley KSF ▪ Former government vision and focus. The support for former Chief minister from Non Resident Indians ▪ Infrastructure development ▪ Good government incentives and tax reliefs ▪ Abundant pool of human resource

A1.2.2 Hong Kong Science and Technology Park

1		PROFILE INFORMATION
Common Name of Technology Park		HKSTP
Location		Hong Kong Science Park (HKSP), a 22-hectare state-of-the-art infrastructure on the Tolo Harbour waterfront in Pak Shek Kok, New Territories
Phone		(852) 2629-1818
Formal park Name		Hong Kong Science & Technology Park
Address Line 1		**Head Office** 8/F, Bio-Informatics Centre, No. 2 Science Park West Avenue Hong Kong Science Park, Shatin, New Territories, Hong Kong
Fax		(852) 2629-1833
Primary Focus		HKSTP's role is to act as a catalyst that brings together talented people and ideas in a way that will enable Hong Kong to serve as a hub of innovation and creativity for the entire PPRD. During the past year, we laid firm foundations for the realisation of this vision.
Background		Inaugurated on 7 May 2001 as a statutory body set up by the Government of the Hong Kong Special Administrative Region, the Hong Kong Science and Technology Parks Corporation (HKSTP) is leading the transformation of Hong Kong into Asia's hub for technology innovation in the focused clusters (Electronics, Biotechnology, Precision Engineering , and IT & Telecommunications). HKSTP offers a comprehensive range of services to cater for the needs of industry at various stages, ranging from offering a series of management and technical support programmes through industry and university collaboration; nurturing technology start-ups through the Incu-Tech programme support at a Tech Centre; providing advanced facilities and support services in the 22-hectare state-of-the-art Hong Kong Science Park for applied R&D activities; providing land and premises in the three Industrial Estates totaling 239 hectare for hi-tech manufacturing. Advanced facilities and support services available for high technology companies include an IC Design/ Development Support Centre and a Photonics Development Support Centre for its tenants and incubatees as well as access to the best scientific and business minds that Hong Kong, China and the world have to offer.
Vision		To play a leading role for Hong Kong to become a major international centre of innovation and technology development in the focused clusters*, and a hub for high value-adding, skill-intensive manufacturing and service industry capacities.

Mission		• To provide quality infrastructure and support facilities for innovation and technology development in the focused clusters* and the upgrading of manufacturing and service industry capabilities • To provide full-service incubation programme for technology start-ups • To foster partnership and collaboration between industry and universities/applied research institutes through consulting, training and research programmes
Location		See Above
Facilities		**Accommodation** **See attached PDFs:** HKSTP Phase 1.pdf HKSTP Phase2.pdf **Car Parking** One **Carpark Building** - supplying over 550 parking spaces to all drive-in visitors at an attractive rate.
Services		 **Services** **Conference / Meeting Rooms and Exhibition Area** There are a number of conference/meeting rooms and exhibition area fully equipped with audio visual equipment for presentation, general meeting and special events. These include: • 3 Multi-purpose rooms • 1 Presentation room • 7 Meeting rooms • 1 Audio visual room with video conferencing equipment • A 900 square meter indoor exhibition area

Business Centre

Located near the exhibition area and the meeting rooms, the business centre offers a range of basic necessities for traveling visitors and guests, which includes phones, faxes, computers ... etc.

IT & Telecommunications Facilities

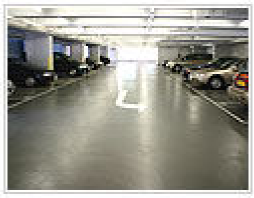
To ensure that all guests and visitors can benefit from the world-class technology and to realize the benefit of information age, the Park provides a comprehensive range of IT services:

- Intranet and Internet Services
- Video Conferencing equipment with ISDN BRI connections
- Information Kiosk

- PC Smart Card
- Wireless LAN
- News/Advertisements LCD and Plasma Display Monitors

Serviced-Apartments

Hong Kong Science Park provides a number of fully-furnished serviced apartments for tenant companies on flexible short-term and long-term basis. Ranging from 700 sq.ft. to 1,895 sq.ft., each apartment has spacious living room, fully-fitted open kitchen, and en-suite bathroom. Weekly maid service, internet access, 24 hour convenient store, and dial up food delivery service enable tenants a convenient home away from home.



Fitness and Recreation Centre

HKSP provides tenants a comfortable and relaxing environment to recharge and revitalize after a hard day's work.

The Centre provides:

- Full-range fitness and training equipment
- Stereo player
- Magazines and newspaper
- Sauna Room
- Bath towel and locker for storage

Shuttle Bus Services and Car Parking

There are about 1,000 private vehicle parking spaces available for tenants/visitors in the Park. In addition to the Bus service provided by KMB between the University KCRC and the Park, the Park offers shuttle service running between Sha Tin and the Park to ensure the tenants/visitors of easy access to and from the Park.

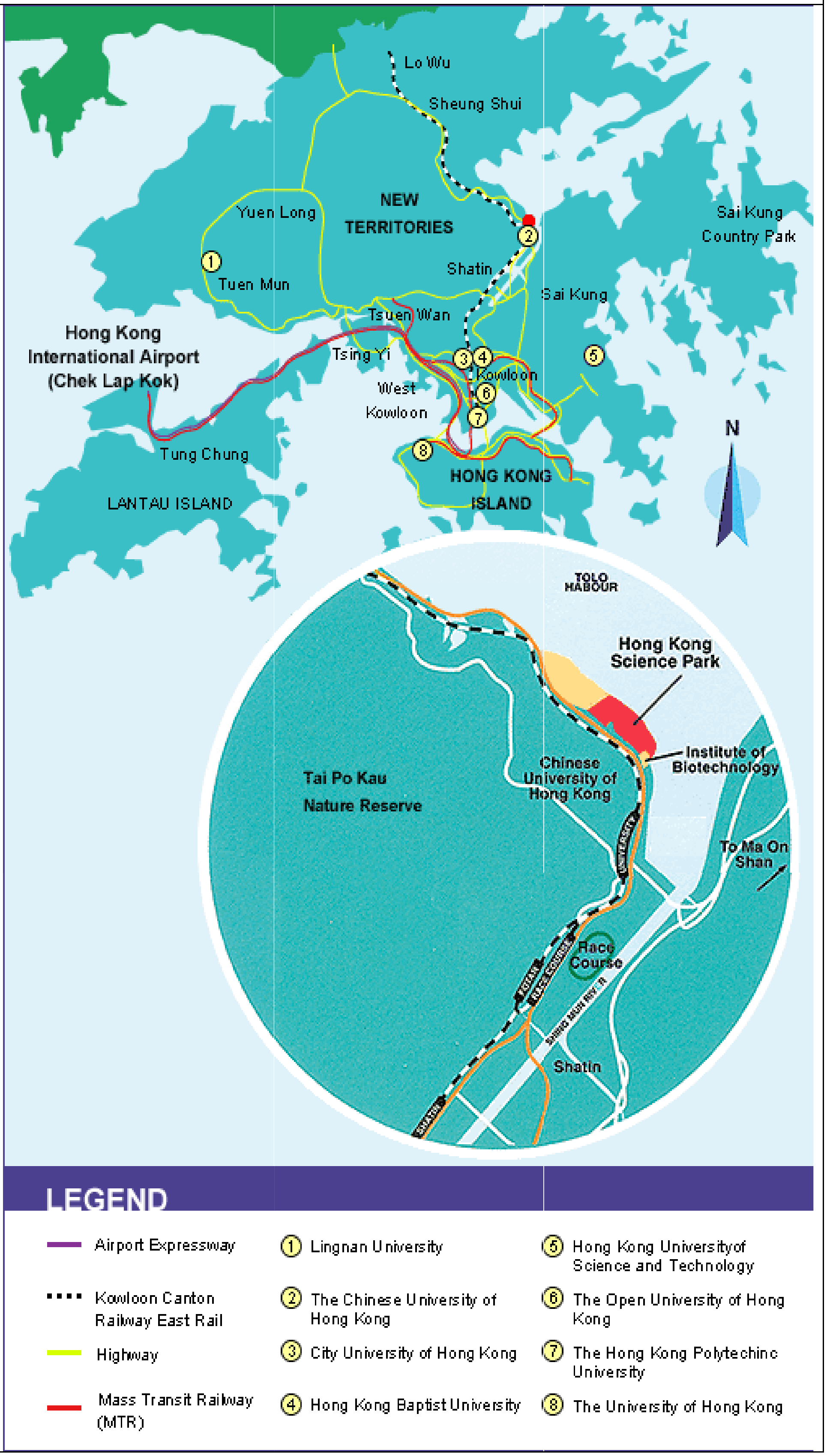
Catering Services and Retail Shops

There are various catering outlets such as cafe, food court, restaurant and bar/lounge available in the Park providing a wide range of food and beverage services from regular menu to banquet arrangements for special events. A variety of retail shops such as convenience store and other service providers can also suite the needs of the tenants/visitors.

Facilities Management Team

A team of on-site professional facility management staff provides smooth and customer-oriented services.

Map of Tech Park



		
Principal Technologies in Tech park		IC Design, Optoelectronics, Herbal medicine
Production, Revenues and Export Statistics		Total income for the year ended 31 March 2004 amounted to HK$122 million. Profits from sales of land and re-granting of surrendered premises amounted to HK$15 million. Rental income from the Science Park, Tech Centre and Industrial Estates, net of depreciation and outgoings, amounted to HK$16 million. Other operating income totalling HK$91 million primarily consisted of interest income of HK$15 million, property and facilities management income of HK$18 million, deferred income on Government grant in respect of the Science Park buildings of HK$38 million, government grant and income from the IC Development Support Centre of HK$9 million and other income of HK$11 million.
Availability of Human Capital		Very high level of human capital available both from a cost standpoint as well as technically capable resources.
Availability of Finance and Investment Capital		Raising a total of HK$11.7 million in SERAP/IPDAS funding, plus HK$144.8 million in venture capital funding. One of the incubatees, Advanced Card System Ltd., successfully launched an IPO prior to its graduation from the program.
Regional Production System Linkages		Memorandum of Understanding (MOU) was signed between HKSTP and the Ministry of Science and Technology's High Technology Research & Development Centre, People's Republic of China. Collaborative agreements under the "7+1" program were signed between HKSTP and various Mainland China's Integrated Circuit (IC) industrial bases to boost the development of IC design in China. In addition, HKSTP signed MOU for the establishment of the Great China Semiconductor Intellectual Property Trading Centre with the Beijing Semiconductor Industry Association, the Taiwan SOC Consortium, and the Chinese American Semiconductor Professional Association. HKSTP also signed a licensing agreement with ARM [LSE: ARM; Nasdaq: ARMHY], the industry's leading provider of 16/32-bitembedded RISC processor solutions. In addition, it established a Security Committee in partnership with

PCCW and Sun Microsystems to ensure the safety of tenants' intellectual property.

Tenant Firms

Tenant Directory

Science Park: 56 tenants (including 17 incubatees) had leased 69 percent of the total available leasing space in the nine buildings of Phase 1, five of which had been completed by that date. Negotiations with potential tenants were also underway for the remaining 31 percent. The tenants are a 57:43 mix of local and international companies.

Tai Po Industrial Estate has a total area of 75 hectares and was 98.5 percent occupied, as of 31 March 2004. Covering a total area of 66.5 hectares, Yuen Long Industrial Estate was 96.7 percent occupied on the same date. Including its sloping seawall, Tseung Kwan O Industrial Estate has a total area of 75 hectares, of which 36 hectares had been leased to 18 tenants.

- Advanced Analogic Technologies Inc.
- Advantek Biologics (HK) Ltd.
- Andigilog International Limited
- Antonio Precise Products Manufactory Limited
- Apath Technologies
- AsiaPac Net Media Limited
- ASIC Technology Ltd.
- Aspheric Optics
- Aztech Systems (HK) Limited
- Bona Fide (Holdings) Company Limited
- CASTEL Broadband Limited
- Chip and System Technology Center of Vocational Training Council
- Citi-Wit Energy-Saving Systems Limited
- Cluster Technology Ltd.
- Comm Core Ltd.
- Convergence Technologies Ltd.
- Cotco Holdings Limited
- Dragonchip Limited
- e-jing Technologies Ltd.
- E-mice Technologies Group Limited
- Electro-Thermal-Technologies & Components Ltd.
- GP Electronics (HK) Limited
- Hipro Hong Kong Ltd.
- Hong Kong Applied Science and Technology Research Institute Company Limited
- Hong Kong Jockey Club Institute of Chinese Medicine
- Honoh Limited
- Hua Da Biotechnology (HK) Ltd.
- KBK Hong Kong Co. Ltd.
- Lighthouse Technologies Limited
- LPI Precision Optics Ltd.
- LTK Industrial Limited
- Macronix (Hong Kong) Co., Ltd.
- Memec (Asia Pacific) Ltd.
- Mosway Semiconductor Limited

- National Semiconductor Hong Kong Ltd.
- New Time Holdings Limited
- Noveon Asia Pacific Limited
- Omron Electronic Components (H.K.) Ltd.
- On Semiconductor (SCG HKSAR Ltd.)
- Pericom Semiconductor (HK) Limited
- Philips Electronics Hong Kong Ltd.
- Radica Systems Ltd.
- REnex Technology Limited
- SAE Magnetics (HK) Ltd.
- ShaoLin Microsystems Ltd.
- Shinki Corporation of Hong Kong Ltd.
- Skyworks Solutions Worldwide, Inc.
- Solomon Microtech Limited
- Solomon Systech Limited
- Sunpet Industries Ltd.
- Supply Chain & Logistics Technology Ltd.
- Uniforce System Ltd.
- Universal Technologies Holdings Ltd.
- VTech Holdings Ltd.
- WE3 Technology Co. Ltd.
- Yunnan Qu Huan Zhang Pharmacy (HK) Ltd.

Incubatee

- Amonics Limited
- AppoTech Limited
- Blue Solve Limited
- C & C Authentication Laboratory Limited
- DynaCity Technology (HK) Limited
- Everplant Technology Ltd.
- GlobalNet Telecommunication Co. Ltd.
- Hamster Force
- Happy Success Development Ltd.
- His Technology
- HK Microelectronics Co., Ltd.
- iNah Multimedia
- IntelliTech Technologies Ltd.
- JV Photonics Ltd.
- Label Technology
- Lexiwave Technology (Hong Kong) Limited
- Luma Tech Company Limited
- Luminant Technology Limited
- MiniLogic Device Corporation Limited
- Perfisans Networks Company Ltd.
- Pixel Magic Systems Ltd.
- Sengital Ltd.
- SwiftPath (HK) Ltd.
- Techful Electronics Industrial Co., Ltd.
- ViMax Interactive Ltd.
- Voiceware Electronics Limited
- VP Dynamics Labs (LCD-TV) Ltd.
- Zensis Ltd.

Assessment of Success or Failure		Undetermined, little organic growth.
KSFs or KFFs		Similar to the Singapore Science Park, HKSTP is an attempt to create an R&D center and transform a finance and manufacturing economy into a knowledge economy. There is strong government support as well AND the commitment to build a bio science park addition to drive the R&D side of bio science. The park has a high level of occupancy, a key to initiating the social networks necessary to facilitate organic growth and knowledge spillover. The strength of the capital market in Hong Kong means that firms also have good access to capital. As one of the entrée points into mainland China, HKSTP is uniquely positioned to access large talent pools of transnational ex-patriots with expertise and connections into Silicon Valley and firm building. However, the park has issues that are also significant barriers to future success. The parks goals of commercializing R&D for launch into mainland China's manufacturing base, have so far resulted in one success out of 28 opportunities. There is also no real evidence that as of this point of time, Hong Kong has assumed any real central role in regional innovation. There is also little evidence that the park has achieved any of its mission other than occupancy.

A1.2.3 Hsinchu Science Park, Taiwan

1		PROFILE INFORMATION
Common Name of Technology Park		HsinChu Science Park
Location		HsinChu, Taiwan, ROC
Phone		+886-3-577-331
Email address		XYZTp@anyhost.org
Formal park Name		HsinChu Science Park
Address Line 1		No. 2, Hsin-Ann Rd., Hsinchu Science Park,
Address Line 2		Hsinchu, 300, Taiwan, R.O.C
Fax		+886-3-577-6222
Primary Focus		Hsinchu Science Park(HSP) is primarily focused on semiconductors
Background		Science parks are established to introduce high-tech industries and attract talent to Taiwan, promote the upgrading of Taiwanese industries, balance regional development and drive national economic development. Since the HSP was established in December 1980, the government has invested US$1,679 million on park infrastructure and facilities. A total of 384 high-tech companies had been established in the park by the end of 2004, a total of 632 hectares had been developed for the HSP proper, plus an additional 141 hectares for the Jhunan Park. During its 24 year history, the HSP has focused both on research and production, thus profoundly impacting the local economic development and giving the HSP an international reputation and establishing it as a model imitated by other countries.
Vision		In the "Challenge 2008 National Development Plan" with a mission to achieve the goal of industrial value heightening, the government developed and constructed science parks and promoted the biomedical parks on a full-scale, thereby establishing the western bio-technological corridor stretching from north to south in Taiwan. The existing high -tech-based HSP in northern Taiwan includes Hsinchu, Jhunan, Jhubei, Tongluo, Longtan, and the newly added Yilan. To ensure the continuous development and long-term competitive advantage of high-tech industries, the science park will improve its articulation with educational and research institutions and innovation incubators in the future, thus helping develop the industrial research infrastructure. Additionally, it also integrates with other industrial districts and establishes an integral upstream and downstream industry supply chain, to improve the added value of various industrial districts.

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<td>Location</td>
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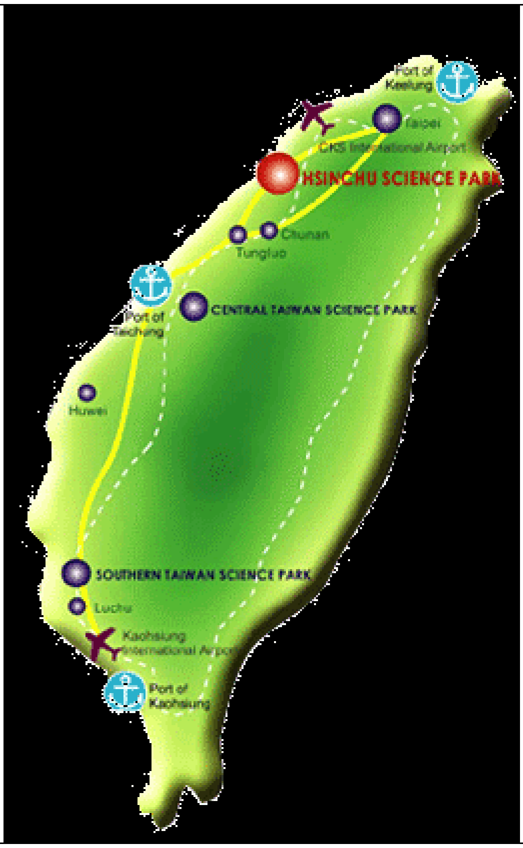

</td>
</tr>
<tr>
<td>Facilities</td>
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Adjacent Universities

- National Tsing Hua University
- National Chiao Tung University
- National Hsin-Chu Teachers College
- Hsuan Chuang University
- Yuanpei Institue of Science and Technology
- Chung Hua University

Research Institutes

- Industrial Technology Research Institute
- National Synchrotron Radiation Research Center
- National Center for High-Performance Computing
- Food Industry Research and Development Institute

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<tr>
<td>Services</td>
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- Bathrooms, service closets, fire alarms system, lighting fixtures, and a freight /passenger elevator with 1500-kilogram capacity.
- Power : AC 60 Hz, 110V, 220V, 380V, or as required.

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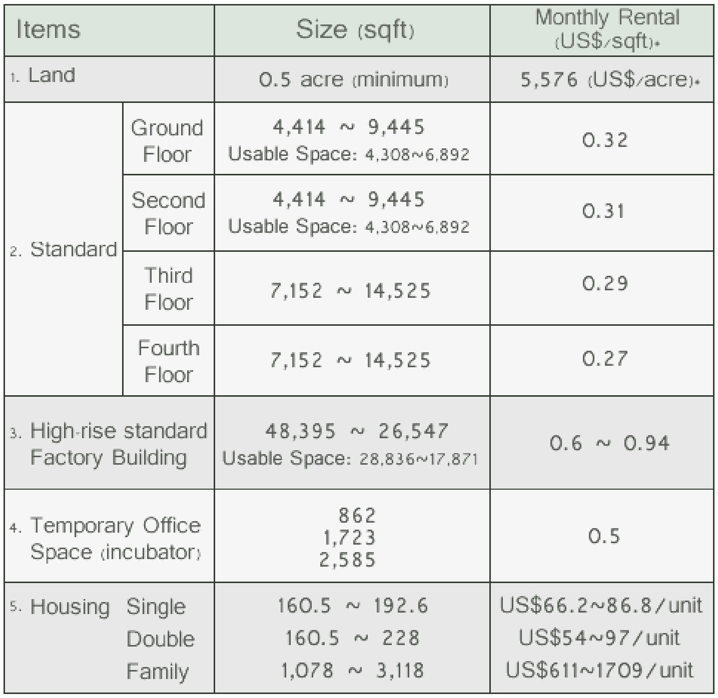
Price/Rent

Rental charges



Items		Size (sqft)	Monthly Rental (US$/sqft)*
1. Land		0.5 acre (minimum)	5,576 (US$/acre)*
2. Standard	Ground Floor	4,414 ~ 9,445 Usable Space: 4,308~6,892	0.32
	Second Floor	4,414 ~ 9,445 Usable Space: 4,308~6,892	0.31
	Third Floor	7,152 ~ 14,525	0.29
	Fourth Floor	7,152 ~ 14,525	0.27
3. High-rise standard Factory Building		48,395 ~ 26,547 Usable Space: 28,836~17,871	0.6 ~ 0.94
4. Temporary Office Space (incubator)		862 1,723 2,585	0.5
5. Housing	Single Double Family	160.5 ~ 192.6 160.5 ~ 228 1,078 ~ 3,118	US$66.2~86.8/unit US$54~97/unit US$611~1709/unit

Principal Technologies in Tech park

Integraed circuits, personal computer, tlecom, optotronics, precision machinery, and BioTech

Production, Revenues and Export Statistics

Growth of Investment-by Industry:Unit:Nt$ Million

Year	Industry						Total
	I.C.	P.C.	Tele com	Opto	Prec. Mach.	Bio tech.	
'86	1,797	1,434	1,458	321	219	478	5,707
'87	4,455	3,158	1,625	443	348	531	10,560
'88	6,311	5,147	2,684	757	391	542	15,832
'89	13,233	9,360	3,395	892	834	509	28,223
'90	22,596	12,549	4,265	1,758	1,015	509	42,692
'91	30,698	13,874	5,859	2,458	1,408	815	55,112
'92	34,573	16,346	6,251	2,994	1,546	1,117	62,827
'93	37,312	16,447	7,162	3,789	1,730	450	66,890
'94	59,495	16,868	8,310	6,158	2,078	589	93,498
'95	99,102	24,999	10,045	10,851	1,958	743	147,698
'96	194,518	34,761	12,386	13,301	2,266	1,121	258.478
'97	289,010	46,173	14,870	20,414	3,231	1,949	375,647
'98	388,967	60,440	18,661	36,720	3,686	2,154	510,628
'99	406,155	75,551	20,015	59,854	2,707	1,738	566,022
2000	514,734	87,876	24,499	62,191	2,720	2,463	694,483
2001	625,246	99,426	30,696	97,668	2,714	3,073	858,823
2002	691,024	62,265	34,083	115,140	4,248	3,235	909,995
2003	752,336	63,633	32,651	133,856	5,389	4,586	992,450
2004	788,924	71,632	25,985	152,476	6,294	4,794	1,050,104

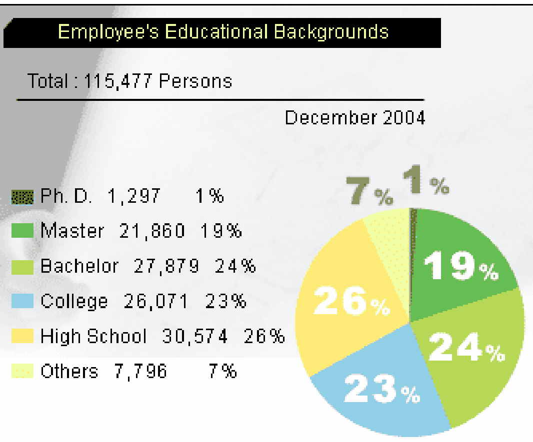
Growth of Combined Sales:

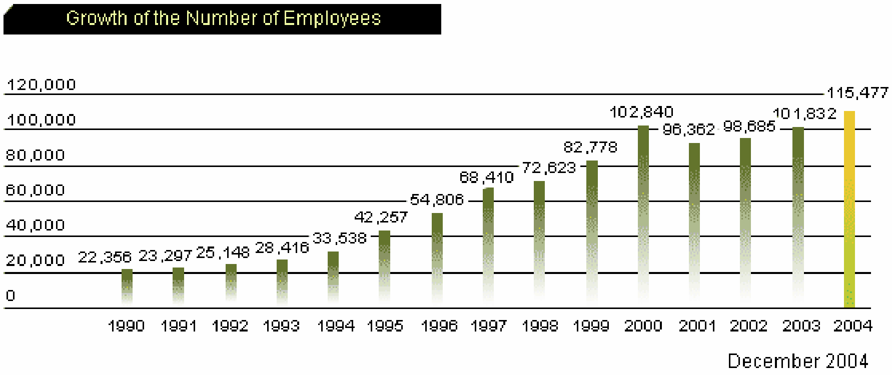
(Unit:Nt$ Hundred Million)

	Industry						Sales	Growth Rate%
Year	Integrated Circuits	Computers & Peripherals	Tele com.	Opto-electronics	Precision Machinery &Materials	Bio-technology		
'86	32.91	118.66	9.65	6.05	2.72	0.44	170.43	iÐ
'87	38.09	199.06	23.48	12.18	2.69	1.85	277.35	62.74
'88	68.08	353.26	45	15.99	3	4.53	489.86	76.62
'89	116.57	345.92	69.85	13.9	5.81	7.13	559.18	14.15
'90	146.49	370.34	113.6	11.43	8.18	5.58	655.65	17.25
'91	233.17	373.44	135.65	18.21	10.46	5.78	776.71	18.5
'92	322.14	385.71	124.48	20.18	13.28	4.59	870.38	12
'93	558.39	541.77	134.7	35.64	16.22	2.87	1,289.59	48.28
'94	840.85	719.08	147.29	47.24	19.46	3.72	1,777.64	37.81
'95	1,479.50	1,215.44	170.02	100.29	24.92	2.01	2,992.18	68.32
'96	1,570.53	1,212.37	192.63	175.34	27.68	2.47	3,181.47	6.36
'97	1,998.84	1,409.62	271.32	278.49	34.14	4.04	3,996.46	25.61
'98	2,308.29	1,598.94	264.48	297.6	75.02	5.69	4,550.02	13.87
'99	3,608.01	2,008.96	323.99	513.88	47.95	6.65	6,509.44	43.1
2000	5,757.11	2,124.89	507.7	809.22	72.58	11.34	9,292.65	42.58
2001	3,757.19	1,610.71	561.23	623.55	47.97	13.35	6,613.99	28.75-
2002	4,562.59	1,245.28	565.58	600.35	53.89	14.16	7,041.88	6.46
2003	5,632.75	1,347.71	564.59	943.35	57.89	18.41	8,564.71	22.3
2004	7,427.38	1,382.45	605.3	1,312.63	92.47	25.39	10,859.22	30.9

Availability of Human Capital

- High-school educated labor force (# and % of total) 26%
- Literate labor force (# and % of total) 99%
- College-educated labor force (# and % of total) 66%
- Scientists and engineers (# and % of total)11%





Availability of Finance and Investment Capital

97 Park companies were listed on the TAIEX and OTC markets at the end of 2004.

Approved Capitals:Unit:Nt$ Hundred Million

Year	Item		
	No. of company	Registered Capital	Paid-in Capital
'81	17	9.2	7.2
'82	26	15.6	11.6
'83	37	24.0	19.6
'84	44	43.7	32.3
'85	50	57.1	40.6
'86	59	67.0	57.1
'87	77	173.5	105.6
'88	94	216.8	158.3
'89	105	354.1	282.2
'90	121	516.9	426.9
'91	137	636.0	551.1
'92	140	741.0	628.3
'93	150	823.6	668.9
'94	165	1,167.3	935.0
'95	180	1,938.5	1,477.0

'96	203	4,084.3	2,585.0
'97	245	5,649.2	3,756.5
'98	272	6,662.7	5,106.3
'99	292	7,346.6	5,660.2
2000	289	9,222.6	6,944.8
2001	312	11,380.15	8,588.2
2002	334	12,283.6	9,099.9
2003	369	13,204.0	9,924.5
2004	384	13,795.3	10,501.0

Growth of Investment - by Source of Capital

Unit:N.T.$million

Year	**Source**			**Total**	**Technical Shares%**
	Domestic	**Foreign**	**Overseas Chinese**		
'86	3,538	1,866	303	5,707	N/A
'87	7,392	2,788	380	10,560	N/A
'88	10,908	3,831	1,093	15,832	N/A
'89	19,925	6,689	1,609	28,223	N/A
'90	31,891	8,837	1,964	42,692	1.79
'91	41,109	11,401	2,602	55,112	1.7
'92	47,578	12,493	2,756	62,827	1.5
'93	52,542	11,359	2,989	66,890	1.5
'94	81,405	9,609	2,484	93,498	3.2
'95	129,851	15,352	2,495	147,698	2.6
'96	225,773	30,077	2,626	258,478	2.3
'97	329,447	43,555	2,644	375,647	3.0
'98	460,217	47,892	2,519	510,628	N/A
'99	522,066	41,499	2,457	566,022	1.4
2000	660,330	23,489	10,665	694,484	1.20
2001	796,515	59,879	2,429	858,823	N/A
2002	840,140	67,823	2,032	909,995	N/A
2003	909,400	81,024	2,026	992,450	0.17
2004	953,741	97,095	2,867	1,053,704	N/A

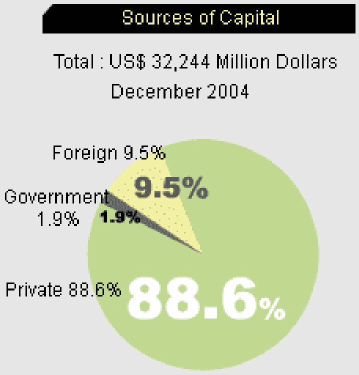
R&D Projects Granted by SIPA

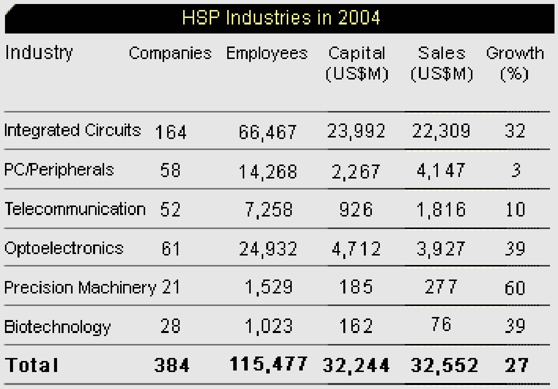
Unit: N.T.$ Million

Fiscal Year	**Company**	**Projects**	**Grants**	**Total Cost**	**% of Grants**
'86	9	22	20	75	26.7
'87	17	34	28	103	27.2
'88	20	31	25	122	20.5
'89	15	18	17	104	16.3
'90	16	23	35	145	24.1

'91	29	33	52	297	17.5
'92	25	31	47	199	23.6
'93	43	54	134	508	26
'94	38	50	97	415	23
'95	34	36	92	333	27
'96	37	46	99	379	26
'97	38	43	109	591	18.5
'98	31	33	74	330	22.4
July,1998-Dec,2000	48	58	140	601	23.3
2001	30	30	72	385	18.7
2002	31	36	99.5	406.9	24.5
2003	28	29	77.3	367	21.1
2004	36	39	106.4	479.6	22.2

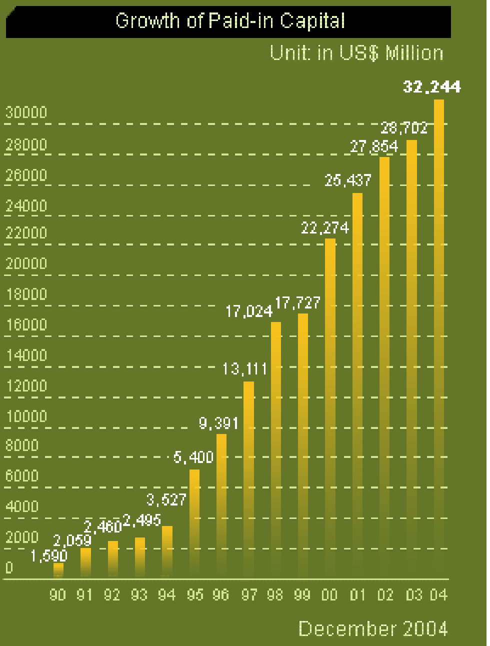
(2004.)

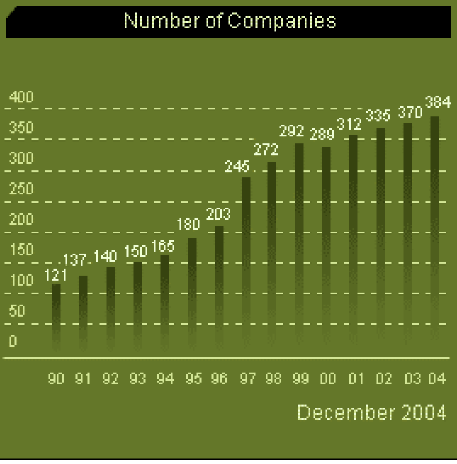


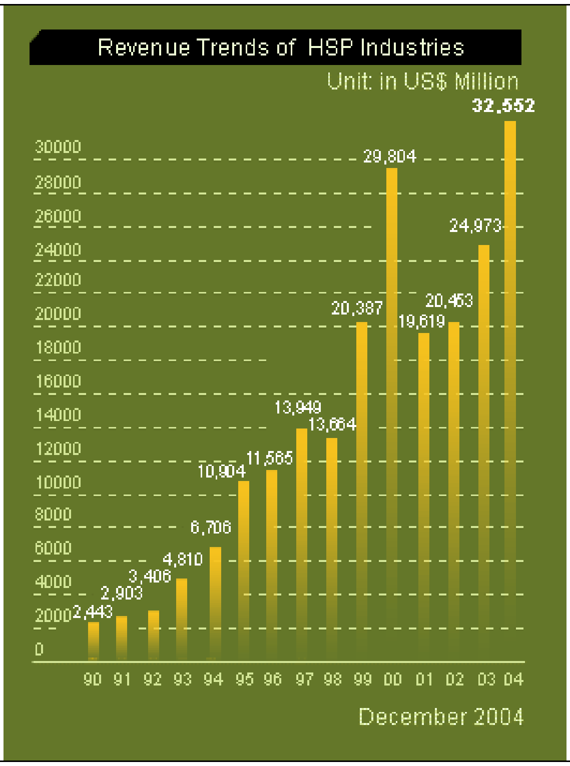


HSP Industries in 2004

Industry	Companies	Employees	Capital (US$M)	Sales (US$M)	Growth (%)
Integrated Circuits	164	66,467	23,992	22,309	32
PC/Peripherals	58	14,268	2,267	4,147	3
Telecommunication	52	7,258	926	1,816	10
Optoelectronics	61	24,932	4,712	3,927	39
Precision Machinery	21	1,529	185	277	60
Biotechnology	28	1,023	162	76	39
Total	**384**	**115,477**	**32,244**	**32,552**	**27**


Growth of Paid-in Capital
Unit: in US$ Million
32,244
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1,590
2,059
2,460
2,495
3,527
5,400
9,391
13,111
17,024
17,727
22,274
25,437
27,854
28,702
90 91 92 93 94 95 96 97 98 99 00 01 02 03 04
December 2004


Number of Companies
400
350
300
250
200
150
100
50
0
121
137
140
150
165
180
203
245
272
292
289
312
335
370
384
90 91 92 93 94 95 96 97 98 99 00 01 02 03 04
December 2004



Resources and Incentives

Protection of Investors' Rights

- Foreign and/or overseas Chinese investors enjoy the same rights and privileges as local Taiwanese investors.
- Foreign and/or overseas Chinese investors may have 100% ownership of a Park enterprise and launch joint ventures with the ROC government or local enterprises.
- Foreign and/or overseas Chinese investors may remit their profits, capital gains and interests generated from their investments.
- The ROC government guarantees that a Park enterprise funded by foreign or overseas investors would not be expropriated in 20 years if the foreign investors hold 45% or more of the enterprise's shares.
- Foreign investor may remit their capital investment overseas in one time after the Park Administrations grants.
- Local laws protect ownership rights and intellectual property rights.
- A Science enterprise may engage in import and export activities related to its principal business, after the approval of the Park Administration

b. Fiscal and tax incentives (Detail)

- No import duties are leviable on machinery, raw materials, fuels, supplies or semi-finished products imported by a Park enterprise for its own use, and the importer is not required to file for exemption from import duties.
- The goods and services exported by a Park enterprise enjoy 0% of business tax and commodity tax.
- For a Park enterprise, according to the "Statute for Upgrading Industries: the newly emerging, important and strategic industries

		stipulated in the Statute for the newly established science industries," a five-year period exemption from the profit-seeking enterprise income tax or the offsetting between stock price and individual investment may apply. **c. Other incentives** Other Incentives based on the Statute for Upgrading Industries: • The newly emerging, important and strategic industries, and technical service industries. The profit-seeking enterprise income taxes for the newly established industries can be exempted partly. The exempted profit-seeking enterprise income tax and its surcharges will not exceed the rate of 20% of stock prices for enterprise, or 10% for personnel (the rate is decreases 1% every two year since 2000). • The automation expenditure: A company may credit 5 to 20% of the amount of fund disbursed for the fund invested in equipment for automation of production or production technology against the amount of profit-seeking enterprise income tax payable for the current year. • R&D expenditure o A company may credit at most 35% of the amount of fund invested in R&D and personnel training against the amount of profit-seeking enterprise income tax payable for the current year. o If the R&D expenditure of the current year is greater than the average R&D expenditure of the previous two years, 50% of the excessive amount may be credited against the amount of profit-seeking enterprise income tax payable for the current year. o Service life of instruments and equipment purchased by a company for exclusive use for R&D purposes, experiments, and/ or inspection of quality may be accelerated to two years o Professional training expenditure: As the incentives of R&D expenditure o To promote balanced development of industries in various geographical areas A Park enterprise may acquire capital through the assistance of "Taiwan Venture Capital Association". With 179 members, the Association holds discussions and seminars periodically and plays the bridging role between the Association and the Park companies.
Tenant Firms		**Computer and peripherals:** At the end of 2004, the HSP contained 58 computers and peripherals related companies. The total revenue of these companies was US$4,147 million, representing a growth rate of 3% from 2003. **Telecomm** As of the end of 2004, there were 52 telecommunication companies in the Park, contributing total revenue of US$1,816 million,representing 10% growth from 2003.

Optotronics

As of the end of 2004, the Park contained 61 companies specialized in optoelectronics. The global economic revival helped the salesrevenue of these companies to reach US$3,927 million in 2004, representing growth of 39 % from the previous year,

Precison machinery

The park contained 21 precision machinery companies in 2004, with total sales revenue of US$277 million, representing growth of 60% from 2003.

BioTech

By the end of 2004, the Park contained 28 biotech companies, contributing total revenue of US$76 million, representing growth of39% from the previous year.

Financial and trade results

Unit: N.T.$Million/Person-yr

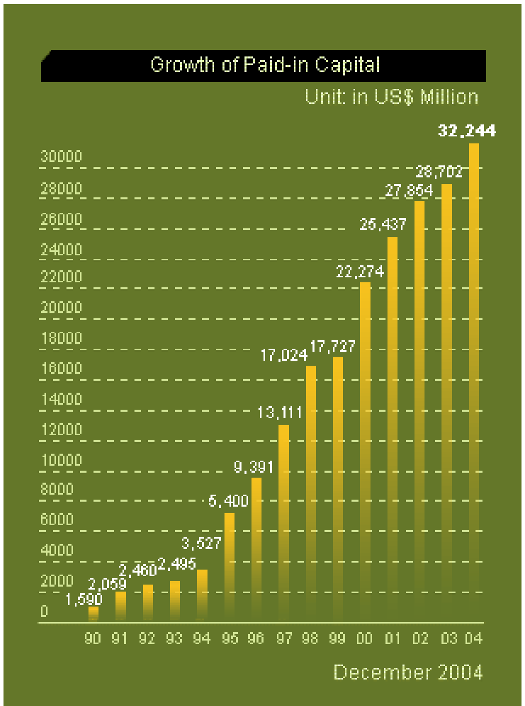
Year	Industry						Total
	I.C.	P.C.	Tele com.	Opto.	Prec.Mach.	Biotech.	
'86	1.91	2.55	1.03	1.48	0.91	0.17	2.06
'87	1.74	2.59	1.72	2.70	0.99	0.78	2.27
'88	1.66	3.80	2.46	2.73	0.79	2.00	2.98
'89	1.88	3.92	2.90	1.97	0.85	2.77	2.93
'90	1.87	4.02	3.37	1.52	0.96	1.81	2.93
'91	2.49	4.32	4.38	1.67	1.28	2.07	3.33
'92	2.95	4.40	4.10	1.63	1.45	1.67	3.46
'93	4.37	5.68	4.12	2.11	1.81	1.15	4.54
'94	5.15	7.45	3.74	1.98	1.95	1.49	5.30
'95	6.58	10.90	4.18	3.07	2.39	0.87	7.08
'96	5.32	8.55	4.39	3.26	2.58	1.11	5.80
'97	5.30	8.17	5.56	3.98	2.64	1.35	5.84
'98	5.60	9.62	5.12	3.89	4.83	1.55	6.26
'99	7.47	12.15	6.11	4.63	4.12	1.57	7.86
2000	9.42	13.22	6.92	4.98	5.37	1.78	9.04
2001	6.43	12.05	8.05	3.86	5.69	1.88	6.87
2002	7.55	9.72	8.23	3.54	6.03	1.98	7.14
2003	9.18	10.97	8.17	4.86	6.11	2.18	8.43
2004	11.22	9.87	10.72	5.26	6.05	2.48	9.58

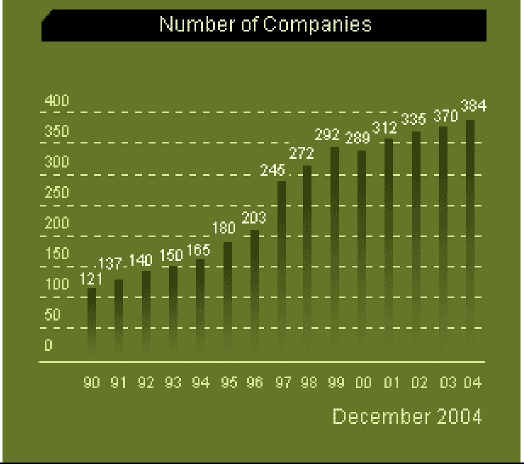
Employment and size

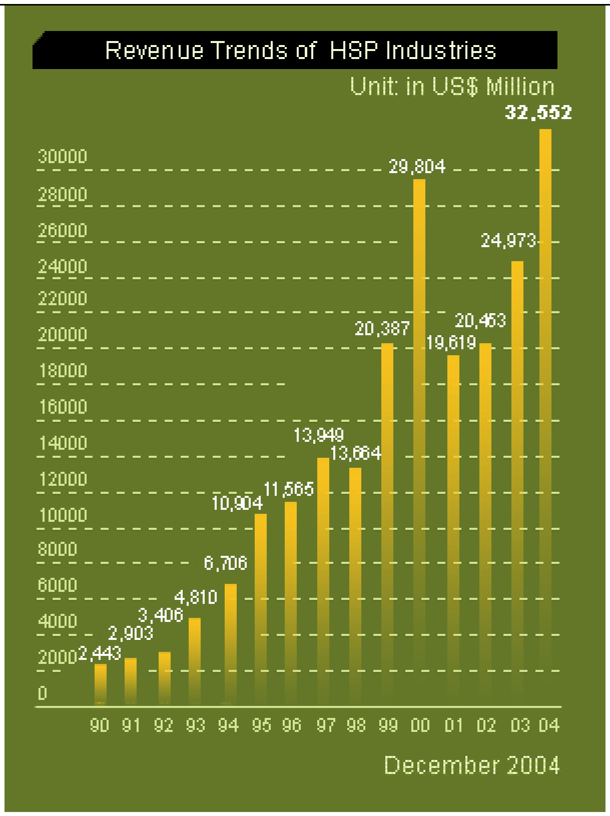
Growth of Employee No - by Industry: Unit:person(included Foreign Labor)

year	Industry						Total
	I. C.	Computers & Peripherals	Telecom.	Opto-electronics	Precision Machinery & Materials	Bio-technology	
'86	1,723	4,651	941	408	298	254	8,275
'87	2,191	7,680	1,369	451	273	237	12,201
'88	4,114	9.305	1,833	586	380	227	16,445
'89	6,192	8,826	2,411	704	681	257	19,071
'90	7,853	9,222	3,369	753	850	309	22,356
'91	9,375	8,644	3,096	1,088	815	279	23,297
'92	10,912	8,765	3,038	1,239	919	275	25,148
'93	12,773	9,540	3,270	1,686	897	250	28,416

'94	16,313	9,649	3,943	2,384	1,000	249	33,538
'95	22,496	11,148	4,071	3,270	1,041	231	42,257
'96	29,510	14,187	4,385	5,386	1,070	268	54,806
'97	37,681	17,263	4,877	6,994	1,295	300	68,410
'98	41,253	16,623	5,170	7,657	1,554	366	72,623
'99	48,284	16,529	5,299	11,110	1,165	435	82,822
2000	61,135	16,064	7,334	16,225	1,351	636	102,775
2001	58,449	13,363	6,975	16,173	843	712	96,515
2002	60,390	12,813	6,869	16,939	893	712	98,616
2003	61,281	12,286	6,912	19,348	948	823	101,598
2004	66,188	14,001	5,644	24,944	1,529	1,023	113,329






Revenue Trends of HSP Industries
Unit: in US$ Million
32,552
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
29,804
24,973
20,387
20,453
19,619
13,949
13,664
11,565
10,904
6,706
4,810
3,406
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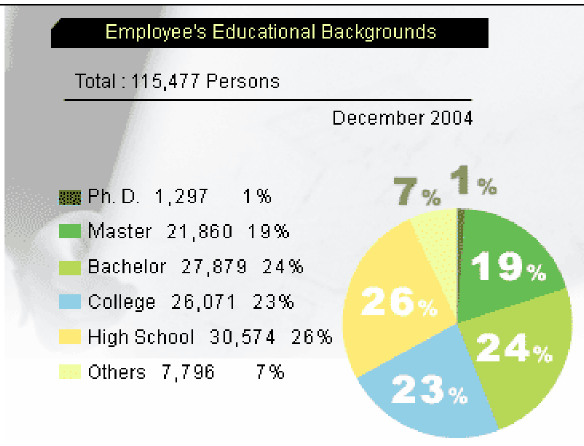
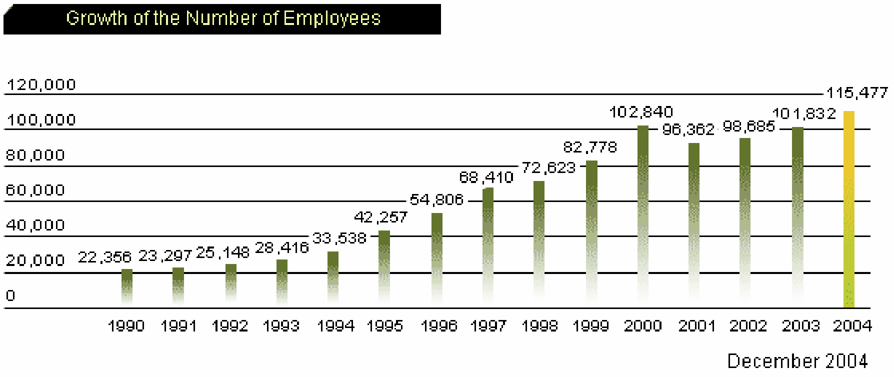
December 2004





Tenant Firm Profiles

Taiwan Semiconductor manufacturing compay

Founded in 1987, TSMC is the world's largest dedicated semiconductor foundry. As the founder and leader of this industry, TSMC has built its reputation by offering advanced wafer production processes and unparalleled manufacturing efficiency. From its inception, TSMC has consistently offered its customers the foundry industry's leading technologies. The company's manufacturing capacity is currently about 4.3 million wafers, while its revenues represent some 50% of the global foundry market.

Assessment of Success or Failure

Back in 2000, HsinChu Science Park was rated 11 out of 16 with a score of 1 out of 4 in established companies. After 5 years of growth, I believe HSP total sale has grown to US$32.5 billion, and there are close to 400 companies employing more than 112,000 people in the parks and 97 companies listed on the stock markets. HSP now would rank 14/16. It is a very successful science park. With so many repatriate Taiwanese, and the government to continue give incentives to start-up companies, HSP will continue to be successful.

KSFs or KFFs		1. HSP was organized and administered by a public-sector agency. The government create a framework for private-sector development that would facilitate, promote, and discipline them. 2. Taiwan set out to create its core high-tech capabilities within the public sector, and then use these institutional creations, such as the Industrial Technology Research Institute (ITRI) as the engines of rapid diffusion of technological capabilities to the private sector. 3. government regulatory and coordination agencies 4. inter-organizational structures: trade associations and product development consortia 5. Government provided a lot of incentives to attract companies to setting up business and offer taxation benefits and allowances, including low-interest loans, R&D matching funds 6. In the beginning of the establishment, they had a goal to focus on Integrated Circuit technology and the park and industries evolved around this.

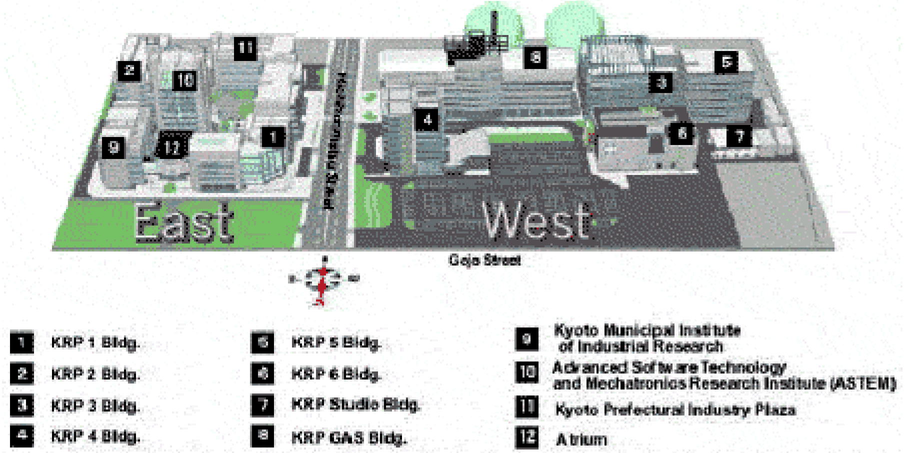
A1.2.4 Kyoto Research Park, Japan

Kyoto Research Park (KRP) is located in Japan in the ancient capital city of Kyoto. KRP was developed by the Osaka Gas Company as Research and Development facility and technology business incubator. KRP is the only 100% privately owned research park in Japan. KRP benefits from close proximity to several leading universities and an old entrepreneurial business culture. Kyoto is a sophisticated blend of the ancient and modern, an urban environment where museums, 5 star restaurants and entertainment flourish alongside temples, small shops and neighborhoods. Most of Japan's Nobel Prices have been awarded to researchers from Kyoto University.

1		PROFILE INFORMATION
Common Name of Technology Park		Kyoto Research Park
Location		Kyoto, Japan
Phone		+81-(0)75-315-8315
Email address		gateway@krp.co.jp
Formal park Name		Kyoto Research Park Co., Ltd
Address Line 1		134 Chudoji Minami-machi, Shimogyo-ku,
Address Line 2		Kyoto, 600-8813 Japan
Fax		+81-(0)75-322-5348
Primary Focus		Information Technology and Biotechnology special focus on Bio Medicine
Principal Owner/Investor		Osaka Gas Co,. Ltd
Background		The Kyoto Research Park (KRP) was founded in 1989 by Osaka Gas. The land on which Kyoto Research Park stands was formerly Owned by Osaka Gas and used for town gas production and storage, which became redundant after the utility switched to natural gas in the 1970's. The company decided to use the land as a research par based on the model of Philadelphia University's Science City Center. KRP is the larges privately funded venture incubator park in Japan as is 100% owned by Osaka Gas. KRP turned a profit in 1996 and wiped out all of its debt in 1998.
Vision		Kyoto is known internationally for its history and culture, but outside of Japan little is said about its entrepreneurial and technological prowess. In fact Kyoto has a long history of international commerce driven by

		world-class venture and technology companies born right here in Kyoto. Kyoto Research Park was established by Osaka Gas Corporation to enhance this tradition, and is proud to play a leading role in promoting exchange among academia, industry, and government agencies. Our unique position gives us access to a wealth of new developments in science and technology, and global markets, which we use on our tenants behalf for strategic partnering and research.
Mission		The Kyoto research park supports enterprises which open new fields and support economic development in the Kyoto prefecture and Kyoto city. Primarily KRP encourages cooperation with local industry, government and academic institutions to promote a creative research and development environment, and contribute to the industrial development of the region.
Location		Kyoto Research Park is conveniently located in the middle of Kyoto's High Tech Valley, just ten minutes from Kyoto Station, international technology giants, and major universities. This close proximity gives tenant companies' quick access to markets, next generation research, and the people behind important business decisions. 53 minutes from New Tokyo International Airport (Narita) to Tokyo Station by Narita Express. 2hours 15 minutes from JR Tokyo Station to Kyoto by Shinkansen "Nozomi" 2hours 30 minutes by Shinkansen "Hikari" 1 hour from Tokyo International Airport (Haneda) to Osaka International Airport by plane. 50 minutes from Osaka International Airport (Itami) to Kyoto by airport bus. 1 hour 15 minutes from Kansai International Airport (KIX) to JR Kyoto Station by Kansai Airport Express "Haruka"
Facilities		**Accommodation** Accommodation — Size (cu. zerons) Gross internal area — 1,076,000 sq. ft.

		Nearby Occupiers include • Kyoto University , Kyoto University of Education, Kyoto Institute of Technology, Kyoto Prefecture University, Kyoto Prefecture University of Medicine, etc. • Murata Corp., Kyocera Corp., Rohm Co., Nintendo Company • Kyoto Prefecture Comprehensive Center for Small and Medium Ents. • Kyoto Municipal Industrial Research Institutes Industrial Tech. Center • Kyoto Industrial support Organization 21 • Advanced Software Technology and Mechatronics Research Institute • Japan Institute of Invention and Innovation Kyoto Office • JETRO
Services		**Services** • Data Center • 1 1 Gigabit Lan, • Wet and Dry Labs • Meeting rooms • Catering Facilities • Gymnasium and Conference Facility hosting over 1000 conferences per year. • Market research, Business matching, Technology matching, Financial advice, Venture Capital Coordination, Introduction to public subsidies, Bookkeeping, Legal services, Incorporation support, General office equipment, Computer services and/or equipment, Secretarial services
Price/Rent		**Price / Rent** Office Space 3,675 Yen/ Sq. Meter plus 1,260 Yen common service Experimental research space 3,990 Yes/ Sq. Meter plus 1,260 Yen common service Booth 52,500 Yen/ Sq. Meter Studio Ridge 3,150 Yen/ Sq. Meter 6 building no. 3,885 Yen/ Sq. Meter

Map of Tech Park		
Principal Technologies in Tech park		Information Technology, IP Telephony, Internet, Semiconductor, Chemistry, pharmacy, drugs, bio-technologies Technical Services Environmental Technology Consulting Material Machine Material Coating, frabication
Production, Revenues and Export Statistics		Kyoto Prefecture includes 7,641 business involved in the manufacturing industry. Total Output by Industry: 18% electronics, 7% Foodstuffs, 8% General Machinery, 4.5% Precision Instruments. Annual Manufacturing Output for Kyoto Prefecture: Yen 5,424,256 million Annual Sales from Business for Kyoto Prefecture: Yen 8,82,399 million Establishements with 10 or more employees Kyoto Prefecture: 3,128 Value of Shipments from Kyoto Prefecture in 2001 Yen 49,810 (100 million), up 11%
Availability of Human Capital		Kyoto boasts the largest concentration of colleges and students in Japan. The University of Kyoto has produced 5 of Japan's Nobel Prize Laureates. Kyoto Consortium of Universities has over 40 member institutions. 9.9% of the people living in Kyoto City are college and university students. • Kyoto prefecture 2,645,451 • Kyoto city 1,470,541 • Kyoto prefecture high-school gradates: 596,975 (15 and over) • Total Employees 1, 035,360 • Total Self Employed 164,531
Availability of Finance and Investment Capital		While Japan is one of the largest industrial economies in the World, it consistently ranks rather poorly in terms of the availability of finance and investment capital when compared it peers. In a 2005 capital access index published by the Milken Institute (Best Markets for Entrepreneurial Finance), Japan listed in 19th place behind not only countries like the United Kingdom, United States, Canada, Germany and Australia, but also developing countries like Malaysia, Chile and Korea. Additionally, a recent OECD study (OECD Science, Technology and Industry: Scoreboard 2005 – ISBN 92-64-01056-4, 2005) showed Japan ranking very low in terms of Venture Capital financing as a percentage of GDP. Japan total VC investment is less than .1% of GDP, ranking it much lower than most developed countries like the United States, United Kingdom, Germany,

		Italy, France and Canada, but also lower than developing countries like Korea, Hungary, Poland, Czech Republic and Greece. Japan's Venture Enterprise Center (VEC) which is part of Ministry of International Trade and Industry has since 1974 supplied R&D-oriented SME's with eight-year loan guarantees for a maximum of 80% up to Yen 100 million. VEC charges a 2% annual fee. Development Bank of Japan (DBJ) Kansai Branch Provides fixed-rate loans to Japanese and non-Japanese companies. Eligible projects are: newly established factories, research centers, retail/ wholesale facilities or international schools. In Kyoto, the Prefecture Government offers several financing programs for firms including: • Special Loan for the Establishing of Corporate Entities- Limit Yen 200 million at 1.5% per year up to 20 years. • Community Development Fund- a multibillion Yen fund set-up to find and foster entrepreneurs in manufacturing fields in Kyoto. Maximum of Yen 100 million per company. Only 8 companies invested between FY 2004-2006. • Global Venture Business Invitation and Fostering Fund aims to attract and foster prospective entrepreneurs from around the world. Planned limit Yen 500 million per company.
Resources and Incentives		1. Kyoto Prefecture Comprehensive Center for Small and Medium Ents. 2. Kyoto Municipal Industrial Research Institutes Industrial Tech. Center 3. Kyoto Industrial support Organization 21 4. Advanced Software Technology and Mechatronics Research Institute 5. Japan Institute of Invention and Innovation Kyoto Office
Regional Production System Linkages		Kyoto is the ancient capital of Japan. Several traditional industries have prospered in Kyoto for over 1000 years and are usually run by families as small and medium size firms. Thus Kyoto has an ancient entrepreneurial tradition. Kyoto was fortunate in that it was not targeted by Allied bombers during World War II. After the war, Kyoto was one of the few cities in Japan with a working infrastructure. Kyoto also benefits from hosting Japan's top universities. These universities have close connections with the companies in Kyoto Prefecture. Kyoto was a center of very fine ceramic fabrication. For centuries, Kyoto ceramic manufacturers produced fine tableware for the noble class. Companies like Kyocera (Kyoto Ceramic Corporation) were able to tap into this expertise and transfer it to the design and production of electrical parts. Kyoto is also host to the computer game giant Nintendo. Many of the companies in the Kyoto Research Park or software companies with formal or informal linkages to Kyoto high-tech industry. Some of Kyoto's local firms in high-tech manufacturing who have succeeded big: Kyocera (Ceramic Chip Packages), Yen 5,897 million Annual Revenue

Murata (Capacitors) Yen 2, 984 million Annual Revenue
Omron (Control Components) Yen 4,514 million Annual Revenue
Rohm (Custom Integrated Circuits) Yen 2,671 million Annual Revenue

Tenant Firms

KRP Firms: Breakdown by Industry

Industry	# Firms	Industry	# Firms
IT (Development)	35	Medical Care/ Health/ BIO	22
IT (Contents Production)	18	Electrical machinery/ Appliances	11
IT (Service)	17	Machine/ Device/ Instrument	9
IT (Communication)	7	Real Estate/ Building Equip.	1
Design/ Printing	13	Construction/ Design/ Eng.	7
Exhibition Plan/ Display	3	University Institutions	7
Plan/ Business/ Service	24	Group Executive Offices	6
Consulting	17	Facility	4
Trade/ Physical Distribution	5		

Assessment of Success or Failure

The Kyoto Research Park is successful in many regards: it is wholly financed by private resources, is fully occupied and has paid all of its debts. From an operational stand-point the project is a money maker. The KRP has been successful in enabling cooperation between industry, government and academia to improve the impact of research, and help small firms gain access to such. It has apparently done well providing an incubation environment for small firms in most respects via a broad range of services to tenants. However, one definite failure of the KRP is making financing available to firms. KRP does not provide any financing to firms according to e-mails and web-site. It relies on referring tenants to outside VC or government bodies. In Japan, that is a risky and passive approach to financing tenant firms.

KSFs or KFFs

KSF

1. Private Research Park runs as a business entity.
2. Strong linkages to local government and universities
3. In the heart of a major Academic center.
4. Diverse nature of tenants/ by industry and size
5. Strong focus on networking
6. Presence of strong companies
7. Entrepreneurial culture

KFF

1. Lack of aggressive firm financing strategy.

A1.2.5 Multimedia Super Corridor, Malaysia

1		PROFILE INFORMATION
Common Name of Technology Park		Malaysia Multimedia Super Corridor
Location		Selangor Darul Ehsan, Malaysia
Phone		03-8311-2202/ 8311 2244
Email address		infor@mdc.com.my
Formal park Name		Malaysia Multimedia Super Corridor
Address Line 1		2360 Persiaran APEC
Address Line 2		63000 Cyberjaya, Selangor Darul Ehsan, Malaysia
Fax		03-8318-8519
Primary Focus		Promotion of Knowledge Based Industries to Develop Malaysia
Principal Owner/Investor		Government of Malaysia
Background		The Multimedia Super Corridor (MSC) is Malaysia's most exciting initiative for the global information and communication technology (ICT) industry. Conceptualized in 1996, the MSC has since grown into a thriving dynamic ICT hub, hosting more than 900 multinationals, foreign-owned and home-grown Malaysian companies focused on multimedia and communications products, solutions, services and; research and development. With this unique corridor, Malaysia continues to attract leading ICT companies of the world to locate their industries in the MSC and undertake research, develop new products and technologies and export from this base. The MSC is also an ideal growth environment for Malaysian ICT SMEs to transform themselves into world-class companies. Furthermore, the MSC welcomes countries to use its highly advanced infrastructural facilities as a global testbed for ICT applications and a hub for their regional operations in Asia.
Vision		The MSC Cybercity and Cybercentre serve as the physical location and environment to catalyze and support growth of ICT and ICT-enabled industries and in tandem extend the benefits of ICT to local community. In essence, the MSC Cybercities / Cybercentres are designated to house the MSC-Status companies. The MSC Cybercity and Cybercentre follow the concept of industry clustering by locating similar technology companies within the same geographical areas. Industry clustering is a proven mechanism to fuel economic growth, either on regional or national level. This has been demonstrated through the success of Silicon Valley, and even Penang. Clustering also drives innovations and helps to accelerate the development, and technological competencies within the area. One of the key elements that

<table>
<tr><td></td><td></td><td>drives an industry cluster lies in the inter-networking and collaboration activities among the companies (and universities) residing in the cluster. The MSC's high speed data networks and infrastructure also serve as a test-bed for many new ICT technology and products. Clustering of these companies indeed optimizes and rationalizes the high cost of infrastructure invested to create the necessary MSC enabling environment in the MSC Cybercities and Cybercentres.</td></tr>
<tr><td>Mission</td><td></td><td>The Malaysian government had set a goal to reach developed nation status by 2020. The government had declared that the only way to reach this status was to shift the economy from a labor-based to a service-based economy. The MSC was selected as the means to achieve that goal.</td></tr>
<tr><td>Location</td><td></td><td>The MSC is a dedicated 15 X 50 km Corridor, stretching from the Petronas Twin Towers in the north to the Kuala Lumpur International Airport in the south; and encompasses Cyberjaya (the Technology Core) and Putrajaya (the new administrative capital of Malaysia).</td></tr>
<tr><td>Facilities</td><td></td><td>

Accommodation

The MSC Corridor is a series of complexes designed to support the Malaysian Governement Vision of a massive, special Greenfield environment designed to enable companies to collaborate in new ways and reap the rich rewards of the Information Age.

<table>
<tr><td>Accommodation</td><td>Size (cu. zerons)</td></tr>
<tr><td>Cyperjaya was conceptualized as a model intelligent city for the world.</td><td>7,000 acres</td></tr>
<tr><td>Enterprise Complex</td><td>900,000 sq. ft.</td></tr>
<tr><td>Incubation Center</td><td>68,900 sq. ft.</td></tr>
<tr><td>Technology Park Malaysia was developed to propel Malaysia into the knowledge-based economy.</td><td>230 Acres</td></tr>
<tr><td>Enterprise Building</td><td>561,000 sq. ft.</td></tr>
<tr><td>Incubator Building</td><td>113,000 sq. ft.</td></tr>
<tr><td>Innovation House</td><td>8,600 sq. ft.</td></tr>
<tr><td>Kuala Lumpur City Centre- Petronas Towers</td><td>4, 104,404 Sq. Ft.</td></tr>
<tr><td>Universiti Putra Malaysia</td><td>39 Acres</td></tr>
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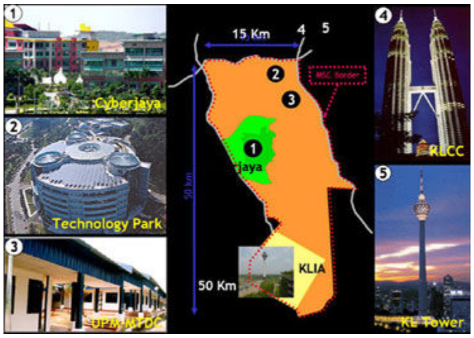


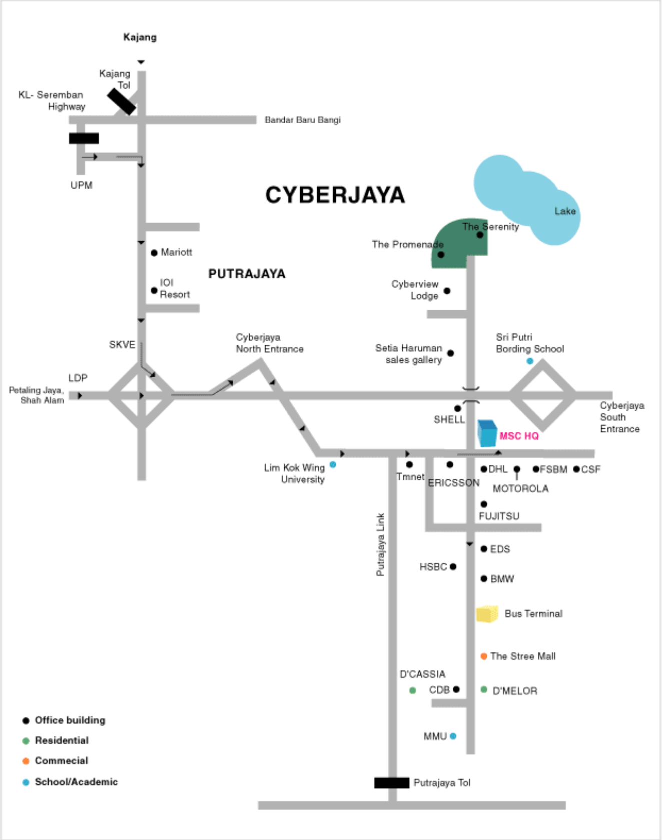
Nearby Occupiers include

- Oracle
- Siemens

</td></tr>
</table>

		• Sun Microsystems • Intel • NTT (Japan)
Services		**Services** • MSC Fiber Backbone Network- The MSC deploys Synchronous Digital Hierarcy (SDI) transport system with a present capacity of 2.5 Gbps and expandable to 10 Gbps. Every building in the cybercities is wired up with fiber optic cable to enable the availability of broadband applications. The fiber optic backbone is directly linked to high-capacity fiber links in Japan, US, and South East Asia. • Electricity- Tenaga Nasional Bhd. Is the largest electrical utility company in Malaysia with a generation capacity of over 12,300 MW servicing 5.3 million customers in the peninsular region. • Water- Perbadanan Urus Air Selangor Bh.d is responsible for potable water supply in the MSC area. With a production capacity of 3,000 megaliteres per day and serving 1.3 million customers. • Telecommunications are provided by three companies: Telekom Malaysia Bhd.; Maxis Communications; TIME dotcom Bhd. These companies have committed to providing world-class telecommunication standards at globally competitive tariffs. • The areas is well provided with by Police, Fire Brigade, Ambulance, etc. • Each Cybercity is provided by 3 star + hotels, sports complexes, theme parks, etc. • Each Cybercity is provided by a full-range of educational facilities including: childcare, kindergarten, Smart Schools, Primary and Secondary Schools, and Universities/ Higher learning Institutions.
Price/Rent		Cyberjaya- 2.50-4.50 sq.ft. land costs 40-60 sq.ft all RM Technology Park Malaysia- 3.45-4.50 sq.ft RM land n/a Kuala Lampur Petronas Towers 8.00 sq. ft RM Land n/a UPM 2.50 sq.ft RM Land n/a

<table>
<tr><td>Map of Tech Park</td><td></td><td>

</td></tr>
<tr><td>Principal Technologies in Tech park</td><td></td><td>Information Technology
IP Telephony
Semiconductor
Telecommunications
Internet</td></tr>
<tr><td>Production, Revenues and Export Statistics</td><td></td><td>GDP Per Capital: 4227 USD
Total GDP USD 2004 PPP $229.3 Billion
Exports of Merchandise: USD $99,370 millions
Imports of Merchandise: USD $81,949 millions</td></tr>
</table>

		Tourist Revenue: UDS $ 5,603 millions
Availability of Human Capital		Total Labor Force: 10,215.6 95% Primary School enrollment Rate Adult Literacy Rate 88.4% Scientist and Engines in R&D (Per Mil. People) 159.9 In the MSC, 620 companies indicated that they employ 19,061 employees. 54% of staff employed by MSC companies have at least a first degree (Bachelor) 24% have Master's Degree and 4% have PhD.
Availability of Finance and Investment Capital		In the MSC, 654 companies responded to questions on paid-up capital. 14% indicated that they have put up to 5 million RM. 56% though, are small firms with put of less than 500,000 RM. 26 companies in the MSC are listed on the MESDAQ. Several Venture Capital firms operate in the MSC. Led by the Malaysian Governments Malaysia Venture Capital Management Bhd. Which recently received $26 USD to invest in open source development. 18 other VC firms are listed as operating in the MSC. The Malaysian Government has also established several grant programs including: • Malaysian Technology Development Corporation: Commercialization of R+D Fund (CRDF); Technology Acquisition Fund (TAF); and TAF for Women. www.mtdc.com.my • Ministry of Science, Technology and the Environment: Demonstrator Application Grants, www.mastic.gov.my/kstas/ • Small and Medium Industries Development Corporation: RosettaNet Grant and E-Commerce Grant for SME Scale Industries. www.smidec.gov.my These grants range from 50,00 RM to 1.7 million RM for product development and commercialization. There are several Debt Financing instruments available through banks and Government backed loan schemes: • Bank Pembangunan dan Infrastruktur Malaysia Bhd. www.bpimb.com.my • Credit Guarantee Corporation www.cgc.gov.my • New Entrepreneurs Fund 2 • Graduate Entrepreneurs Fund • Direct Access Guarantee Scheme
Resources and Incentives		The Malaysia government has established the Multimedia Development Corporation as the agency responsible for overseeing the implementation of the MSC. The MDC markets the MSC globally and works to provide clients with the information and assistance they need to maximize their participation and benefit from the MSC. A cornerstone of the MSC incentive is the 10 Bill of Rights: which ensure that companies will receive the promised benefits: The bill includes some of the following features: • Provide a world-class infrastructure

		• Unrestricted employment of both local and foreign born knowledge workers • Ensure freedom of ownership • Free movement of capital • Competitive financial incentives including: 100 percent tax exemption for up to 10 years or an investment tax allowance for up to 5 years. • Regional leader in IP • No internet censorship • Multimedia Development Corporation as the "one-stop" agency for facilitating firm support. The Malaysian government provides funding support through a variety of venture capital, debt and grant programs. Additionally, the MDC operates programs to ensure that a qualified labor force is available to the client firms through the Human Resource Development Initiative and the Knowledge Worker Exchange. The government allows 100% foreign ownership in new manufacturing projects, where otherwise foreign participation is limited to 30-50% depending on industry.
Regional Production System Linkages		Malaysia is in a unique position with close proximity to South East Asia starting with Singapore. Additionally, linkages exist with Japan. Both countries companies are well represented in the MSC.
Tenant Firms		259 Firms in Systems Tools and Utilities 278 Firms in Shared Services & Outsourcing 246 Firms in Technology Blocks 289 Firms in Infrastructure Systems 426 Firms in Industry/ Vertical Applications 315 Firms in Enterprise Applications 247 Firms Content Development
Tenant Firm Profiles		Attached.
Assessment of Success or Failure		The MSC is an enormous project designed to transform the entire economy of Malaysia into a knowledge based economy (today, it is primarily a commodity based resource intensive economy). This is a very tall order for any type of project and the time frame for this project to achieve its goals is long: Malaysia will be a developed country by 2020. Malaysia is number 14, ahead of Spain, Japan, France and South Korea in terms of Capital Access (Milken Institute 2005 Capital Access Index) which shows that Malaysia is making significant progress in promoting access to financing for firms. Malaysia has had great success in attracting foreign electronic firms, which use the company as an export base. Malaysia's MSC did suffer a major set-back from the Asian Financial Crisis in 1997, however, most of the problems have been solved and the country is back on track.

KSFs or KFFs		KSF • Intense government support for financing and entrepreneurship. • "High-Touch" focus providing massive incentives for firms KFF • Too much government involvement. Perhaps more private sector participation would be beneficial to the project.

A1.2.6 Singapore Science Park

1		PROFILE INFORMATION
Common Name of Technology Park		Singapore Science Park
Location		Singapore
Phone		(65) 6336-2288
Email address		
Formal park Name		Singapore Science Park
Address Line 1		250 North Bridge Road
Address Line 2		#24-00 Raffles City Tower
Fax		(65) 6339-6077
Primary Focus		
Principal Owner/Investor		Idontgoto University, Erewhon, Nocountry
Background		Singapore has implemented an aggressive strategy consisting of a number of programmatic initiatives in several targeted areas. These initiatives have served to promote an image of Singapore as a nation on the rise with a business climate that encourages technology infusion. Initiatives consist of several financial incentives including tax incentives to encourage companies to undertake significant research and development activities. Perhaps the most visible of all these efforts in the late 1970s and early 1980s was the creation of the Singapore Science Park, which over the years has earned a reputation as Southeast Asia's foremost address for research and development. The Science Park was a government sponsored initiative designed to provide a focal point for the high-quality infrastructure essential for industrial research and development in Singapore, as well as an environment conducive to interaction between industry, academia and research groups. Today, the Science Park hosts more than 100 companies (information technology, electronics, chemicals, materials, biotechnology, and government agencies) that are engaged primarily in research and development. The workforce in the Science Park consists of some 5,000 research engineers and scientists with over half holding a bachelor's degree and over a quarter holding advanced degrees. The management of the Singapore Science Park was privatized in 1990 to make it more responsive to market conditions and the needs of research and development enterprises. The planned development of the Science Park will continue during the next decade. A second phase of the Science Park is expected to be completed by 2001. This stage of development will include an Innovation Center and a Technology Assistance Center to cater to the needs of start-up companies. It will also house a new "TeleTech Park," Asia's first facility

dedicated to research and development in telecommunication.

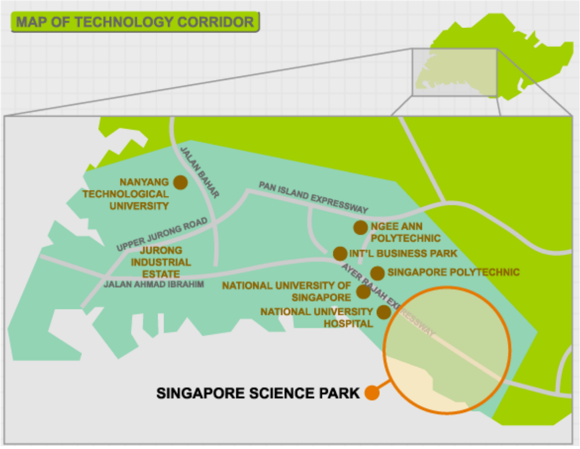
Singapore created a National Science and Technology Board (NSTB) in 1991 to further foster the creation of a research and development intensive environment. Located in the Ministry of Trade and Industry, NSTB's mission is to develop capabilities in both science and technology arenas to enhance Singapore's competitiveness in key industry and service clusters. The NSTB's efforts have led to the steady and rapid development of science and technology, propelling the economy towards high value-added and high-technology content. NSTB actively partners with both local and multinational companies in Singapore to strengthen their research and development capabilities. NSTB's objectives include: working with industry to assist in training the research and development workforce; establishing and overseeing national research institutes and centers; and fostering international science and technology linkages.

The NSTB has a number of tools to accomplish these objectives including the Research Incentive Scheme for Companies (RISC) and the Research and Development Assistance Scheme (RDAS). These schemes help companies to develop research and development facilities and capabilities in strategic areas of technology, as well as embark on project-based research and development. The Singapore government provides incentives and assistance including offering no tax on company profits for five to ten years, providing a lesser tax on export profits and establishing a skills development fund.

The success of Singapore's strategy in creating a technology-intensive climate is evidenced by a number of indicators. The World Competitiveness Report has consistently rated Singapore among the top countries in the world in computer density, information technology literacy and strategic exploitation of information technology by companies. The information technology industry in Singapore has achieved compounded average growth of about 26% per year over the past decade, with revenues exceeding the S$6 billion (US$4.1 billion) mark in 1995. More companies are using Singapore as their Asian base than anywhere else, especially in software research and development, data hubs and network management centers. In addition, 90% of companies in Singapore with more than ten employees are computerized and the country possesses a pool of 21,000 highly-trained information technology professionals.

Singapore launched "IT2000 - A Vision of an Intelligent Island" in 1992 to provide a framework to guide information technology development in Singapore into the 21st century. IT2000 seeks to develop Singapore into an Intelligent Island, where information technology is pervasive in every aspect of its society, including home, work and play. The goals of IT2000 include developing Singapore into a global hub, boosting Singapore's economic engine, enhancing the potential of individuals and linking communities locally and globally.

Through strategic planning and program implementation developing the key ingredients of technology-intensive regions, Singapore has catapulted itself to the vanguard of technology states. Further, it is Singapore's vision that in fifteen years, it will be among the first countries in the world with an advanced nationwide information infrastructure that will interconnect computers in virtually every home, office, school, and factory.

Vision		Singapore's strategy for the future involves building upon its existing foundation, image and climate adding new ideas, programs, and plans. The government is committed to building world-class capabilities to spur the growth of new high value-added industries and is committing S$4 billion (US$2.74 billion) over the next five years to science and technology activities to achieve this goal. In 1996, Singapore began implementation of a five-year National Science and Technology Plan ("NSTP 2000") aimed at building world-class science and technology capabilities through: industry research and development, technology infrastructure, manpower development, technopreneurship and internationalization. **Vision:** **We provide a focal point for R&D and innovation in Singapore and the region.**
Mission		The Singapore Science Park, developed and managed by Ascendas, is Asia's most prestigious research and development (R&D) and technology hub. It was set up under a government initiative in 1980 to provide infrastructure for R&D to flourish in Singapore. Since then, the Park has gained a reputation as South East Asia's foremost address for R&D. Lushly landscaped surroundings create the ideal ambience and environment where innovations transform into successful businesses. Value-added services plus recreational activities add to the vibrancy and networking amongst tenants in the Park community, and with academia from nearby tertiary institutions. **Mission:** **We create total business environments that inspire people to excel.**
Location		The Singapore Science Park is located just minutes away from Jurong Industrial Estate and the Central Business District. The Park lies at the heart of Singapore's 'Technology Corridor' which conglomerates a high concentration of knowledge-based corporations, research agencies and tertiary institutions. 

Facilities

Accommodation

Accommodation	
Gross internal area	
Office Accommodation	
Ground Floor	
First Floor	
Second Floor	
High Bay Warehouse	
Restaurants (fully fitted)	
R&D Complexes	9 complexes.
Site Area	112 Hectares

Amenities

AUTOBANKING

CHILDCARE

SOCIAL & RECREATIONAL

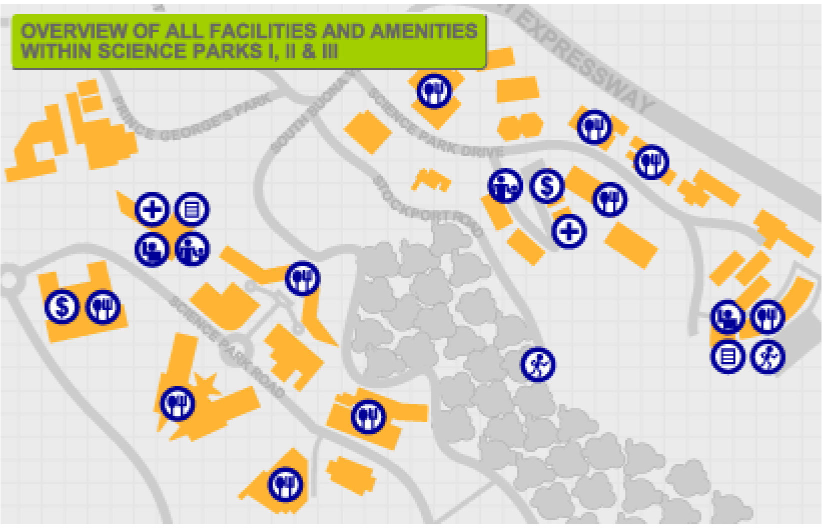
CONFERENCE FACILITIES

CONVENIENCE STORES

SHUTTLE BUS SERVICES

CLINICS

F&B OUTLETS



Various amenities and facilities are available to facilitate formal and informal interaction between industry, academia and research groups.

Completing the work-play environment are first-class amenities that make the Singapore Science Park unique among hi-tech developments in Asia. The S$12 million Science Hub amenity centre comprises facilities such as a 245-seat auditorium, fully-equipped function rooms, an air-conditioned exhibition area that presents the ideal setting for staging product launches, evening cocktails and exhibitions.

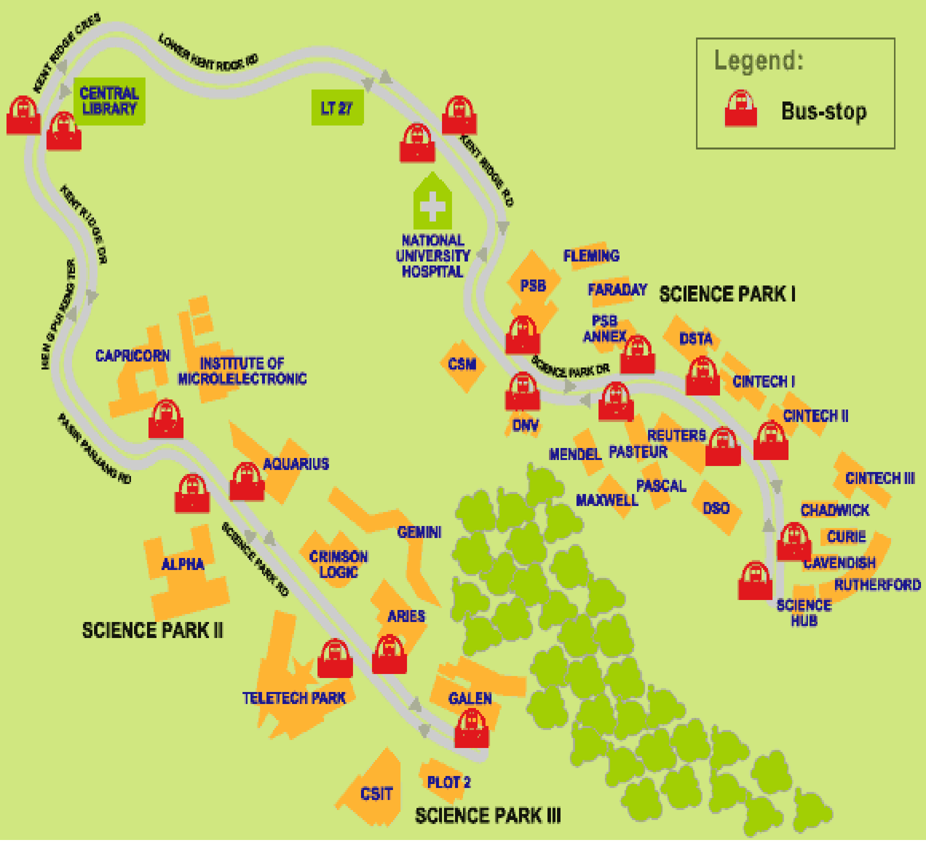
The function rooms have a seating capacity of 100 persons and are equipped with the latest audio-visual equipment and presentation aids. All facilities are for lease to Science Park tenants and non-tenants. Click on "CONFERENCE FACILITIES" to find out more details.

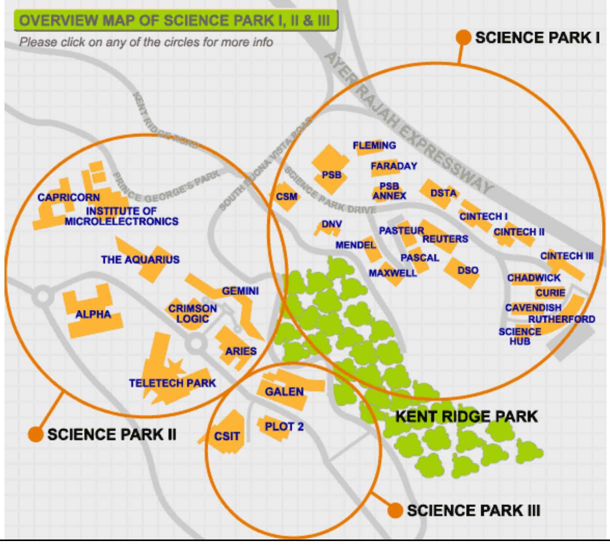
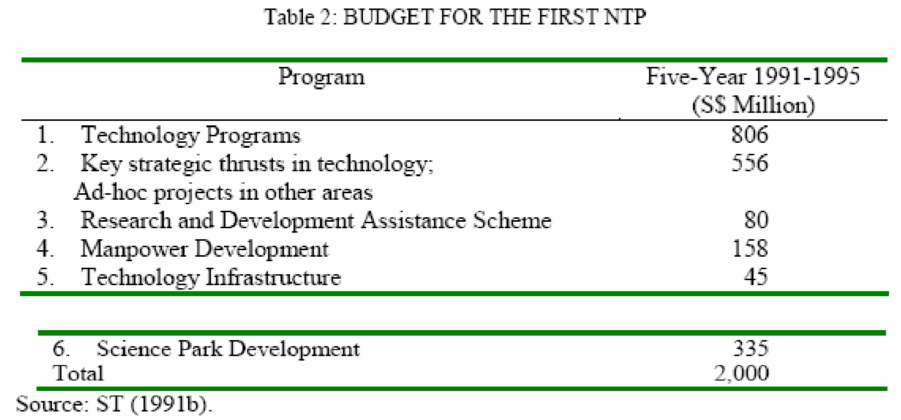
Also located within the Science Hub is the Fitness Network with facilities such as:

- Swimming pool
- Tennis courts
- Squash court
- Aerobics studio
- Fitness gymnasium
- Steam baths
- Jacuzzi
- Billard room

Car Parking

Plenty of parking at each facility and public transportation to and within the park.

		 **Nearby Occupiers include** • National University of Singapore • Nanyang Technological University • Ngee Ann Polytechnic • Singapore Ploytechnic • National University Hospital
Services		• Significant infrastructure available to tenants • Large number of amenities, see above • Building services • Research, incubator and business office space available
Price/Rent		Starter units @ S$17.10/sqm (Chew, 1984) Leased Lan @ S$11.60/sqm (Chew, 1984) Office space between S$21.5 and S$54/Sqm

<table>
<tr><td>Map of Tech Park</td><td></td><td>
</td></tr>
<tr><td>Principal Technologies in Tech park</td><td></td><td>Wide mix, see partial tenent list. IT, Telecom, BioScience R&D among others</td></tr>
<tr><td>Availability of Human Capital</td><td></td><td>Currently there are more than 7,000 research engineers and scientists as well as support staff working in the Singapore Science Park.
The majority of employees working in the Park have a basic degree, primarily majoring in Computer Science, Science and Engineering.
Approximately 52% of the employees in the Park have a basic degree while 16% have a Masters degree and 12% have PhDs</td></tr>
<tr><td>Resources and Incentives</td><td></td><td>
Table 2: BUDGET FOR THE FIRST NTP
<table>
<tr><th>Program</th><th>Five-Year 1991-1995 (S$ Million)</th></tr>
<tr><td>1. Technology Programs</td><td>806</td></tr>
<tr><td>2. Key strategic thrusts in technology; Ad-hoc projects in other areas</td><td>556</td></tr>
<tr><td>3. Research and Development Assistance Scheme</td><td>80</td></tr>
<tr><td>4. Manpower Development</td><td>158</td></tr>
<tr><td>5. Technology Infrastructure</td><td>45</td></tr>
<tr><td>6. Science Park Development</td><td>335</td></tr>
<tr><td>Total</td><td>2,000</td></tr>
</table>
Source: ST (1991b).

Few specifics on incentives offered in available research</td></tr>
<tr><td>Tenant Firms</td><td></td><td>Tenants in the Science Park include Sony, Exxon Chemical, Silicon Graphics, Lucent Technologies, British Petroleum, Seagate Technology International, Centre for Wireless Communications, the Institute of Microelectronics, the National Science & Technology Board and the National Computer Board.</td></tr>
</table>

Table 2. Profile of firms in the Survey and Tenant Directory, 2000

	Survey sample firms			All firms in the Tenant Directory	
Nature of industry	Local	Foreign	Total (percentage)	Total	Percentage
Information technology	6	2	8 (24)	72	43.4
Chemicals	1	4	5 (15)	19	11.4
Telecommunications	2	2	4 (12)	10	6.0
Engineering	1	2	3 (8.7)	16	9.6
Food/Flavours	0	3	3 (8.7)	7	4.3
Life sciences	1	2	3 (8.7)	6	3.6
Pharmaceuticals	2	1	3 (8.7)	5	3.0
Others	1	2	3 (8.7)	14	8.4
Electronics	1	1	2 (5.8)	17	10.3
Total	15	19	34 (100)	166	100

Sources: Tenant directory (http://www.sciencepark.com.sg; accessed in January 2000) and authors' survey.

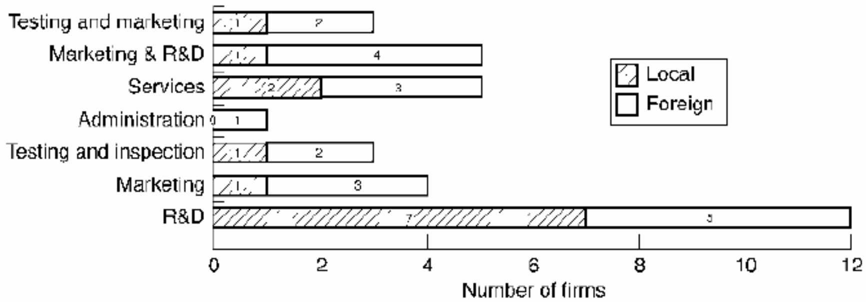


Figure 3. Summary of tenant firms' main activities. *Source*: Authors' survey.

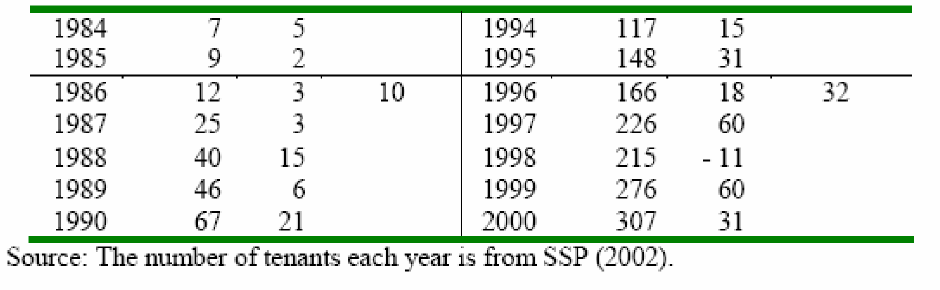
Table 5. Collaborations among tenants in the Park

	R&D project developments	Product development	Testing and inspection
Number of firms (percentage)	22 (65)	15 (44.1)	18 (40.9)
Firms in Park			
Yes	13	4	9
No	9	11	9
Status			
On-going	5	9	12
Once only	17	6	6

Note: Total number of firms in survey = 34.
Source: Authors' survey.

Table 1. INTAKES OF THE SSP'S TENANTS

Year	No. of tenants	New tenants		Year	No. of tenants	New tenants	
		No.	Average			No.	Average
				1991	75	8	16
1982	1		2	1992	95	20	
1983	2	1		1993	102	7	



1984	7	5		1994	117	15	
1985	9	2		1995	148	31	
1986	12	3	10	1996	166	18	32
1987	25	3		1997	226	60	
1988	40	15		1998	215	- 11	
1989	46	6		1999	276	60	
1990	67	21		2000	307	31	

Source: The number of tenants each year is from SSP (2002).

KSFs or KFFs

The park is a success from the standpoint that it has a high rate of occupancy, so from the standpoint of a real estate development project it is a success. However the criteria that the park has listed as its mission do not support the definition of success. In fact the development of the bio science park is being down to specifically correct problems defined in Singapore Science Park.

There is lack of entrepreneurial development with in the park. Despite the re-location of several government departments to nurture this type of activity. There is little apparent knowledge spillover evident. Such knowledge spillover that does exist could be due to the size of Singapore.

Though the park management is now privatized, it was started with direct government support and continues to expand using the same type of support. The government is committed to development of the park and additional space to facilitate the transition from a manufacturing economy to knowledge based economy. The hope is that Singapore can transition to an innovation center that drives research and development in the region, a nearly identical mission of the Hong Kong Science park. The large amount of public equity financing also appears to be crowding out private equity capital, and forcing it to later stages. Public funds do not typically have the same selection criteria or the same skills in helping these fledgling companies to grow.

Most of the starts up firms launched in the park were done so while their product development was still at an applied stage. These premature launches resulted in firms that could not scale and declined quickly.
Singapore lacks a transnational community of ex-patriots that can bring the skills and connections to tie it into the global economy. These communities exist for countries like China, India and Taiwan.

On the plus side, the strength of the national commitment to changing the economy and transitioning to a regional R&D leader. The park does have full occupancy and there is a clear drive for entrepreneurial development and innovation. Singapore's connections into the global financial markets are also a clear plus. Though the majority of equity raised is being sent out side of the country. There are clear successes here, but there are also barriers to meeting the parks mission.

A1.2.7 ZhongGuanCun Technology Park, China

1		PROFILE INFORMATION
Common Name of Technology Park		ZhongGuanCun
Location		Beijing,China
Phone		+86 10 6891 5118
Email address		hdgwh@zhongguancun.com.cn
Formal park Name		ZhongGunCun Haidian Science Park
Address Line 1		A7, Baishiqiao Road, Haidian District
Address Line 2		Zip Code: 100081
Fax		+86 10 6891 5214
Primary Focus		High Technology including electronics, integrated optical/mechanical and electronic technologies, new material and biomedicine
Principal Owner/Investor		Chinese government
Background		HSP is the first place of its kind of national standing approved by the Chinese Government. The government agencies involved have formulated a series of favorable policies, putting in huge amounts of capital. In June 1999, the Chinese government approved the proposal to establish the Zhongguancun High-tech Zone on the basis of HSP's stunning success. The State Council issued a directive to the effect that China's development strategy calls for the accelerated growth of Zhongguancun. Thus HSP has turned out to be a significant experimental base for technological innovation, the paradigm for an incubabator which transforms research findings into a productive industrial park in the 21rst Century just as Shenzhen was in the 80's and Shanghai in the 90's. China's imminent entrance to the WTO is also helping government and industry work together to boost science and education, to upgrade industrial infrastructure and to increase China's international competitiveness. China's intellectual resources and technical personnel are relatively concentrated in the capitol making Beijing the natural choice for the establishment of the HSP. However it is by no means to be a development zone simply engaged in high tech manufacturing and sales. It is also a high-tech urban center set to lead the socio-economic development of China and even the Pacific Rim well into the 21st century.
Vision		**Four Bases for Construction:** Zhongguancun Software Park Zhongguancun Biology and Medicine Park

		Zhongguancun Exporting Industrial Park for High-tech Products Zhongguancun Innovation Base **Eight Environments to Improve:** the environment for innovation activities the environment for opening up the environment for legal system the environment for financing the environment for attracting talented personnel the environment for continuous education the environment for industrial development space the environment for government administration and social services
Mission		to promote the development of the capital's knowledge based economy by improving the environment or innovation. Our efforts are meant to be a model for the rest of the nation in this new century.
Location		HSP, covering 100 square kilometers, is located in the town of Haidan which is the seat of the District Party Committee and the District Government. Surrounded by Peking University, Tsinghua University, The Science Town of the Chinese Academy of Sciences as well as many scenic historic spots, HSP is conveniently located next to the 4th Ring Expressway, Suzhou Street and Baiyi Road, all of which are main arteries of Beijing. The park is 25 kilometers south of the Capitol Airport and 10 kilometers north of the West Rail Station.
Facilities		• Universities ○ Peking University ○ Tsinghua University
Services		**Services** • IT services • Libraries ○ The National Library ○ Peking University Library ○ Tsinghua University Library ▪ As the capital of China, Beijing boasts the most advanced infrastructure facilities. It is the transportation hub of railway and aviation in China. The airport expressway stretches from Capital International Airport to the downtown area. Beijing has nearly 12,000 kilometers of standard urban-rural roads. ▪ International calls can be made to more than 200 countries and regions. ▪ Direct mail service has been established with 207 cities in more than 127 countries and regions worldwide. ▪ Fibre optic network available ▪ Cable TV ▪ new telephone station handling 60,000 telephones will be built.

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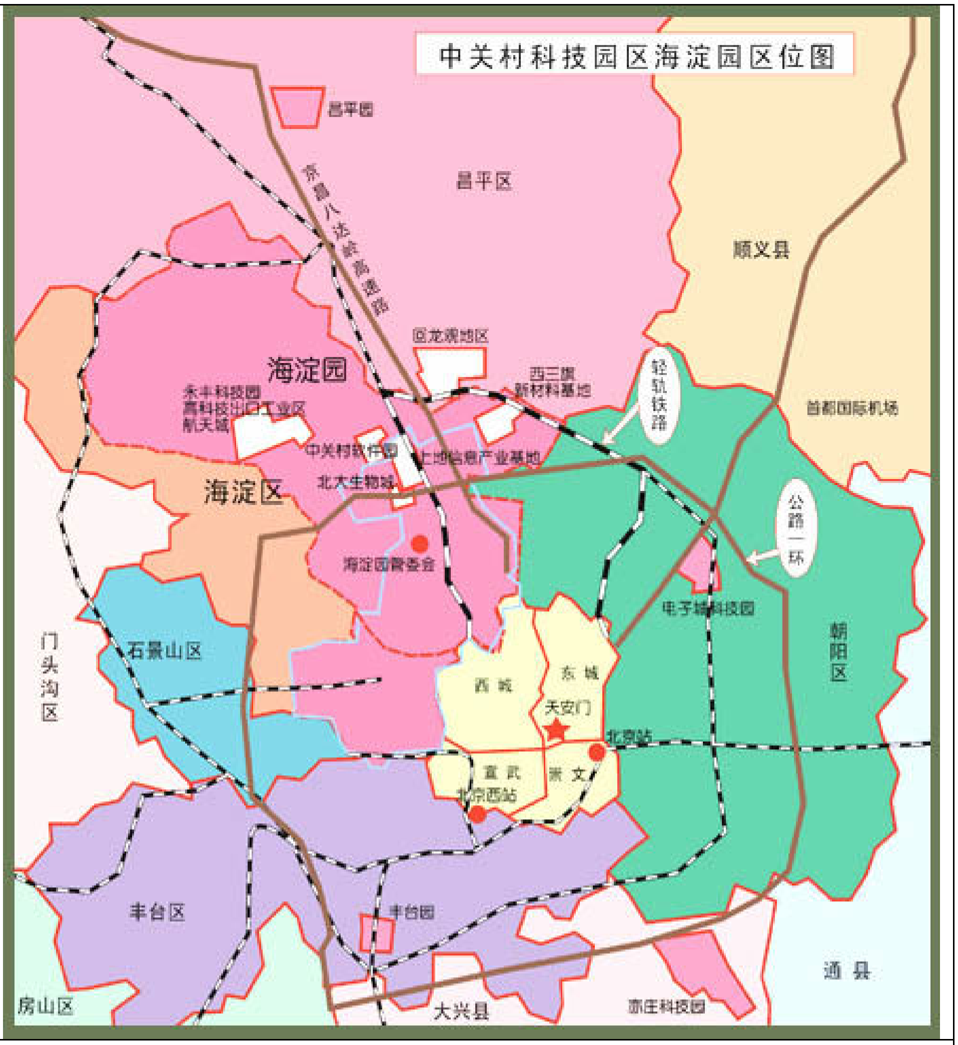
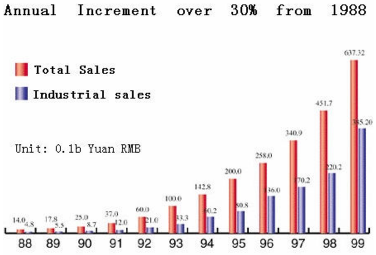
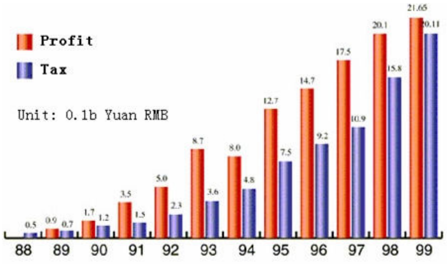


</td>
</tr>
<tr>
<td>Principal Technologies in Tech park</td>
<td></td>
<td>Electronics: 79.6%
Integrated optical mechanical & electronic 6.3%
Pharmacy, life science and biomed 3.4%
New material, energy, and environmental science 9.3% others 1.4%</td>
</tr>
<tr>
<td>Production, Revenues and Export Statistics</td>
<td></td>
<td>Number of companies > 6000
Number of employess > 400,000
Total sales 63.32 bn RMB (1999)
45.17bn RMB (1998)




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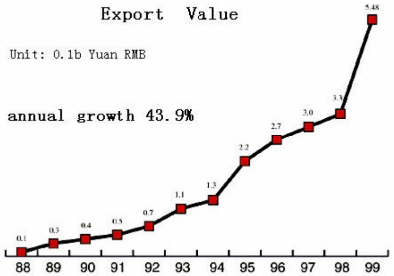
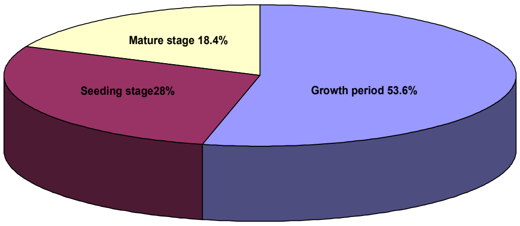
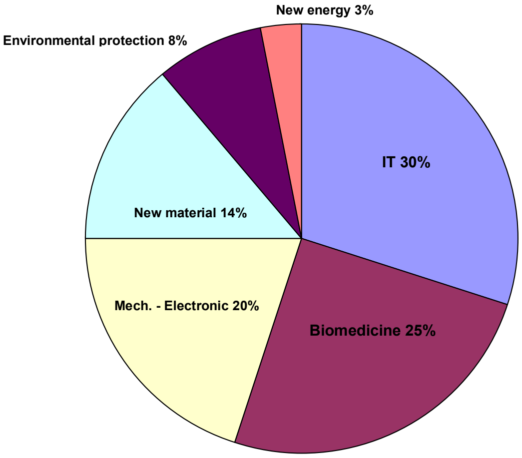
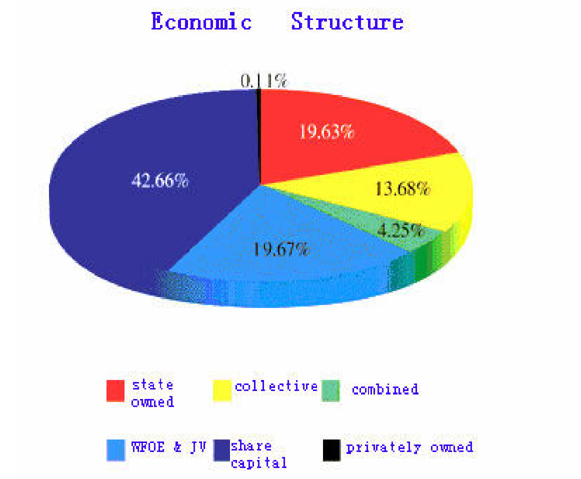
<tr><td></td><td></td><td>
</td></tr>
<tr><td>Availability of Human Capital</td><td></td><td>

- High-school educated labor force (# and % of total) 11.8%
- Literate labor force (# and % of total) 99%
- College-educated labor force (# and % of total) >55%

</td></tr>
<tr><td>Availability of Finance and Investment Capital</td><td></td><td>



These are Figures in 2001.
Source: "The Comparison Research of Venture Capital Investment Trends in the United States and China", By: Zhang Guilin December, 2002 on http://www.zgc.gov.cn/cms/template/index_english.html</td></tr>
</table>



Source: http://www.zhongguancun.com.cn/en/overview/overview2.asp.htm

Resources and Incentives

High Tech Zones

Preferential policies on tax

· The income tax of a new technology enterprise shall be levied at a reduced rate of 15%. If output value of its exports amounts to 40%, or more than 40% of its total output value of the year, the income tax shall be levied at a reduced rate of 10%.

· The new technological enterprises shall be exempted from income tax within 3 years of the date of its establishment. From the fourth to sixth year, its income tax rate may be reduced by half on the basis of the rates specified before.

· Since 1999, if a project realizes the achievement of high and new technology, the local income of income tax within 3 years of the date of its first sale will be returned to the enterprise.

· Since 1999, increased local income of income tax within 4 years will be returned to high and new technological enterprises which have operated for 10 years in a new technology experimental zone, on the basis of the last year.

· The increased local income of income tax of key high and new technological enterprises recognised by government or high and new technological enterprises, whose sale income of new product amounts to 40%, or more than 40% of its total sale income, will be returned on the basis of the last year.

· Since 1999, the increased local income of income tax with 3 years will be returned to software enterprises or system integration enterprises on the basis of the last year.

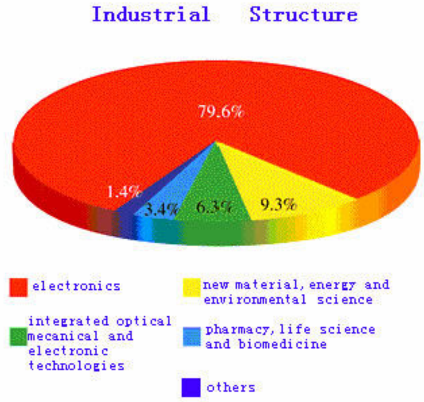
Preferential policies on import and export

· Upon approval by the Customs, bonded warehouses and bonded factories may be set up in experimental zones. The export products shall be exempted from export duties.

· The imported raw and processed materials and spare parts for export shall be exempted from import duties.

Other financial Incentives

Besides preferential taxes, there are other financial incentives to support ZSP

		or high and new technology enterprises. For example: · Beijing Municipal Government has set up a "Technology Innovation Fund" to support high and new technology enterprises. The fund will be invested in market research, project exploitation, venture capital, and loan guarantee. · High and new technology enterprises that have completed stock company reorganization can apply to issue stocks and bonds without limitation on rating or scale. · Enterprises in ZSP can open foreign exchange account on current account. · Reward for intermediaries who help Haidian District attract foreign funds to invest in programs as high and new technology enterprises, commercial consultation services, health, education and information program, etc. Non-financial Incentives · Since 1988, researchers and professors in institutes or universities have been encouraged to have a part-time job or to find a job in high and new technology enterprises, or set up their own enterprises. · Qualified personnel inducted from other places in the country by high and new technology enterprises can get "Beijing employment resident card."
Tenant Firms		 **Source:** http://www.zhongguancun.com.cn/en/overview/overview2.asp.htm 150 companies in the ZGC whose overall turnover for 2000 exceeded 100 million yuan. (That's $12.2 million USD)
Tenant Firm Profiles		Lenova: Largest PC manufacturer in China, recently bought IBM PC division Source: http://www.davisva.com/charleswu/IBMLenova.pdf ▪ Legend Computers was founded in 1984 with Chinese government funding ▪ Started out as a distributor of computers and printers ▪ Moved up the food chain by designing its own personal computers ▪ By 1997, it passed IBM to become the largest seller of PCs in China $3B in revenue ▪ Ranked 8th globally among PC makers ▪ Overall leader in Asian outside Japan ▪ Controls 27% of Chinese PC market
Assessment of Success or Failure		ZhongGuanCun Science Park is on the road to success. The park has been growing significantly. It supported around 400,000 employees. Yet most of them are in manufacturing areas. There is a lack of high tech R&D environment.

KSFs or KFFs		1. Limited sources of capital, 2. Lack of stimulation and inhibition mechanism, 3. An exit mechanism for venture capital has not been established 4. Intellectual property and immaterial assets are not sufficiently protected 5. Lack of high-quality personnel in some fields, especially in management experience 6.Lack of global advanced technology 7. Rampant piracy in the country makes it difficult to survive as a software company, which requires the least amount of capital to start.

A1.3 The European Union

A1.3.1 Sophia Antipolis, France

1		PROFILE INFORMATION
Common Name of Technology Park		Sophia Antipolis
Location		France, Europe
Phone		04 92 96 78 00
Email address		info@sophia-antipolis.org
Formal park Name		Sophia Antipolis Science Park
Address Line 1		Place Sophie Laffitte BP 217
Address Line 2		06904 Sophia Antipolis Cedex
Fax		999-999-9999
Primary Focus		Information technology, Electronics and Telecommunications (23% of firms, 43% of jobs)
Principal Owner/Investor		Prefecture Des Alpes- Maritimes
Background		Prior to 1968 (in France), cities such as Paris were the center of commerce, education, innovation, culture, and connectivity. The success of the Stanford Research park (founded in 1951 in the US) proved the combination between knowledge and industry could be profitable. Pierre Lafitte, considered the Park's founder, used his personal network to realize his vision of a major hub of art, education, innovation, and commerce in the French country side. At the time (1968) most of the politicians and developers were only interested in heavy industry, but the cultural revolution of 1968 helped this innovative and risky endeavor to progress. In 1964, Lafitte joined the Ecole des Mines in Paris (one of the Grandes Ecoles) where he proposed a reviluntionary plan to decentralize research laboratories into a Science Zone north of Antibes. The fact that the Grandes Ecoles (French for *great schools*) of France are higher education establishments outside of the mainstream framework of the public universities. They are generally focused on a specific field of study, have a moderate size, and often are very selective on the admittance of their students. They are often regarded as prestigious, and form the channel from which most French managing directors and executives evolve. Lafitte's vision was one of connecting education, research and technology. Lafitte used political and public connections to gain support for his radical idea. These contacts included: 1) Emile Hugues (father-in-law), senator of the Alpes-Maritimes; 2) Michel Bavastro, owner of the daily paper Nice-Matin; 3) Jérôme Monod, Managing Director at

		DATAR (French national agency for regional planning and development); and 4) Claude Daunesse, Director of the École des Mines. In 1967, Lafitte created an association (called Armines) that would propel his vision. The associations motto, Lier le savoir au savoir-faire, translates into "Connecting knowledge and know-how." In 1968, Lafitte suggested a "layering" method where École des Mines would develop an intellectual center near Antibes. Subsequently, other schools were to follow with similar development of Rennes and Toulouse. The park was given a Greek name Sophia Antipolis (Sophia means wisdom and Antipolis was the name of a Greek city and represented the notion of bucolic creativity outside the city. Sophia was also the name of Pierre's wife. In 1969, the Sophia Antipolis Association is created. Later, it was instrumental in the creation of a non-profit economic interest group, called Sophia Antipolis Valorization. Its purpose was to attract organizations to the new "intellectual desert" north of Antibes, purchase land and necessary infrastructure. In 1972, the Comité Interministériel pour l'Aménagement du Territoire (Interministerial committee for land development) approved the creation of a 2,300 ha, high-level scientific, industrial and service sector park. The park was to have international scope, and was approved for development beginning at Valbonne, one of the original five communes of Sophia Antipolis. In 1974, the effort was further perpetuated by a joint syndicate developer by the name of SYMIVAL, which later became SYMISA (which was in charge of the general policy for the development of the park, its administration and financial management until December 31, 2001). Also in 1974, the first company, FRANLAB, a subsidiary of the Institut Francais du Petrole (French Oil Institute), was established on the park site. In 1975, Rohm & Haas, one of the largest manufacturers of specialty chemicals serving global markets in paint and coatings, electronics, household products/detergents/personal care products, moves to Sophia Antipolis from Zurich. In 1977, Sophia Antipolis attracts the World Reservation Center of Air France away from Paris. Since the arrival of the first company, in 1974, Sophia Antipolis has attracted the creation of 25,911 direct jobs and 1,260 companies.
Vision		Pierre Lafitte dreamed of brining the creativity, culture, connectivity, and excitement of the French Latin Quarter to the countryside; an "International city of wisdom, science and technology on the French Riviera". In 1960, Lafitte wrote an article titles "Latin Quarter in the fields," which was published in the Le Monde newspaper. The vision was a major hub of art, education, innovation, and commerce outside the city limits of Paris. It was of a connection of skills to financial markets where the link between knowledge and industry, education, research and technology would create valuable innovations. At its beginning, the park was considered an innovative, daring, and risky endeavor.
Mission		The Sophia Antipolis Technology Park mission is to create and be an international city of wisdom, science and technology on the French Riviera.

Location

Sophia Antipolis is located in the south of Europe on the French Riviera between Nice and Cannes. It spans nine French cities that includes Antibes, Cagnes sur Mer, Cannes, Grasse, Menton, Moughins, Nice and Valbonne. Sophia Antipolis is established on a vast wooded plateau and presently covers 2,300 hectares, or one-fourth the size of Paris. Planned extension to the North of the present Park in the near future will increase this area to 4,600 hectares.

Facilities

Accommodation

Office Accommodation	18,000 sq meters leased in 2003
Restaurants (fully fitted)	19 full service restaurants & 9 take-out stores
R&D Complexes	There are 23 pure R&D firms in the park
Site Area	545,630 sq meters

Nearby Occupiers include:

Universities & Institutes of Higher Learning
There are 66 institutions of higher education are in the area currently.

However, much of the research and technology efforts center on the following universities and national laboratories:

- University of Nice Sophia Antipolis
- National Center for Scientific Research
- National Institute for Agricultural Research
- National Institute for Computer Science Research
- Observatoire de la Côte d'Azur (astronomy)
- INSERM (medical and biotechnology)
- Ecole Nationale Supérieure des Mines de Paris
- CERMICS (mathematics)
- Institut EURECOM (communications and network engineering)
- CERAM (business management and administration)

Hotels – There are 10 hotels including:

- Novatel
- Ibis Hotel
- Grand Hotel Mercure
- Mercure Hotel
- Mediathel
- Omega
- Le Relais
- Formule 1
- Etap hotel

CONTACTS:

Chairmen

Jean-Pierre MASCARELLI (CAD et SYMISA)
jpmascarelli @cad.fr
Jean LEONETTI (CASA)
Pierre LAFFITTE (Fondation Sophia Antipolis)
laffitte @sophia-antipolis.org
Jean ZIEGER (Méditerranée Technologies)
zieger @mediterranee-technologies.com

Directeur Commercial

Christian CABROL (SAEM SAEM)
ccabrol @sophia-antipolis.net

Services

Services

- 14 Law Firms
- 11 Banking Institutions
- 13 Transport Companies
- 18 Sports & Leisure Services/Companies
- 66 Associations & Clubs
- 8 Dentists
- 1 Florist
- 2 Libraries
- 6 Car Rental Companies
- 15 Medical Facilities/Provieders
- 2 Pharmacies
- 30+ Restaurants / Food Service Providers

Price/Rent

We may put on the application / Savehold or please contact directly.

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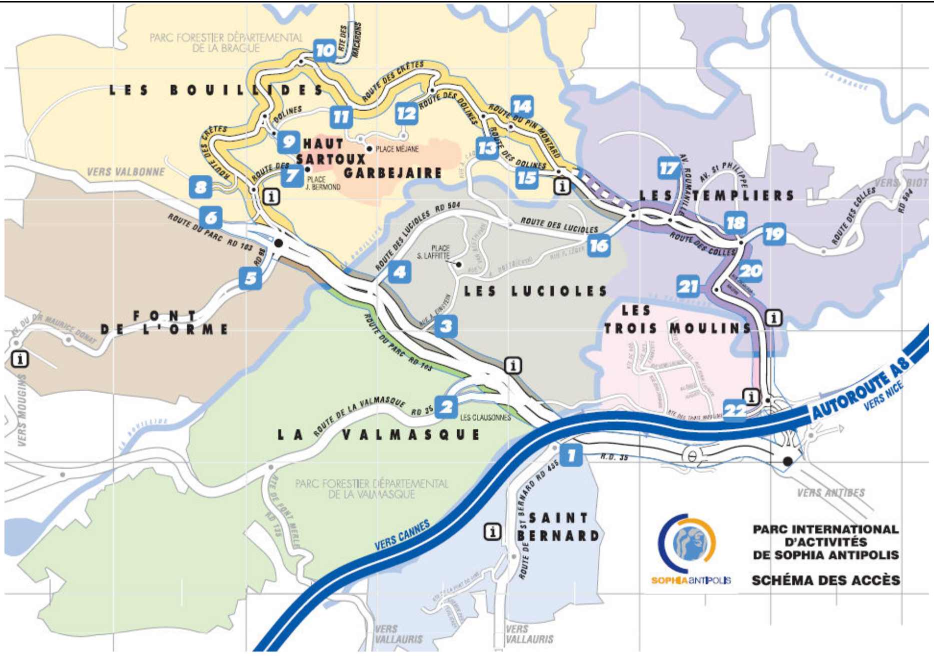
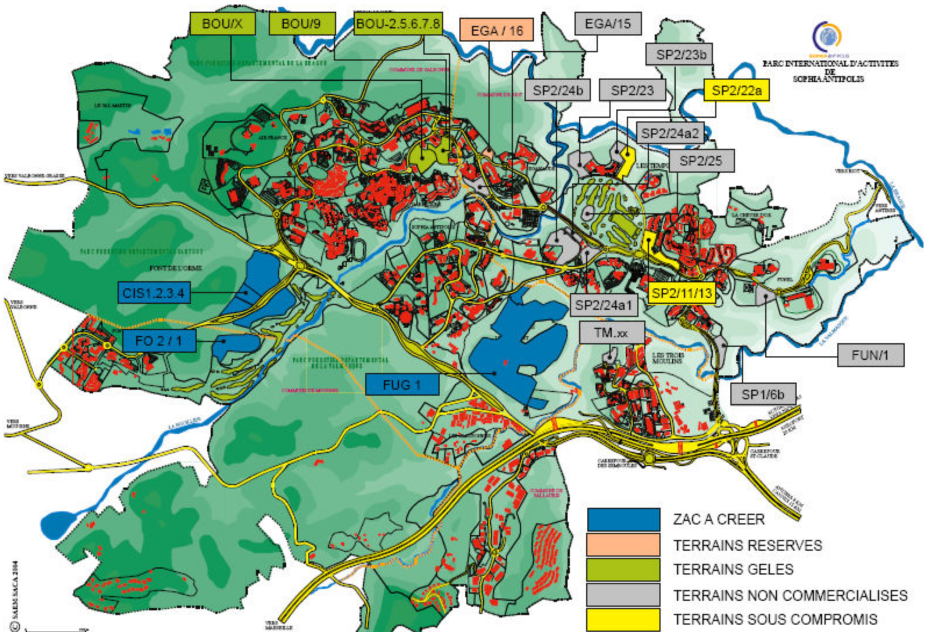
<tr><td>Map of Tech Park</td><td></td><td>

22 - Les Trois Moulins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<tr><td>Principal Technologies in Tech park</td><td></td><td>HIGHER EDUCATION & RESEARCH: The University of Nice-Sophia-Antipolis and the CNRS (GB= SERC, USA=NSF) and their numerous research and training laboratories and institutes, the IUTs (technical institutes) and IUPs form a university pole in harmony with</td></tr>
</table>

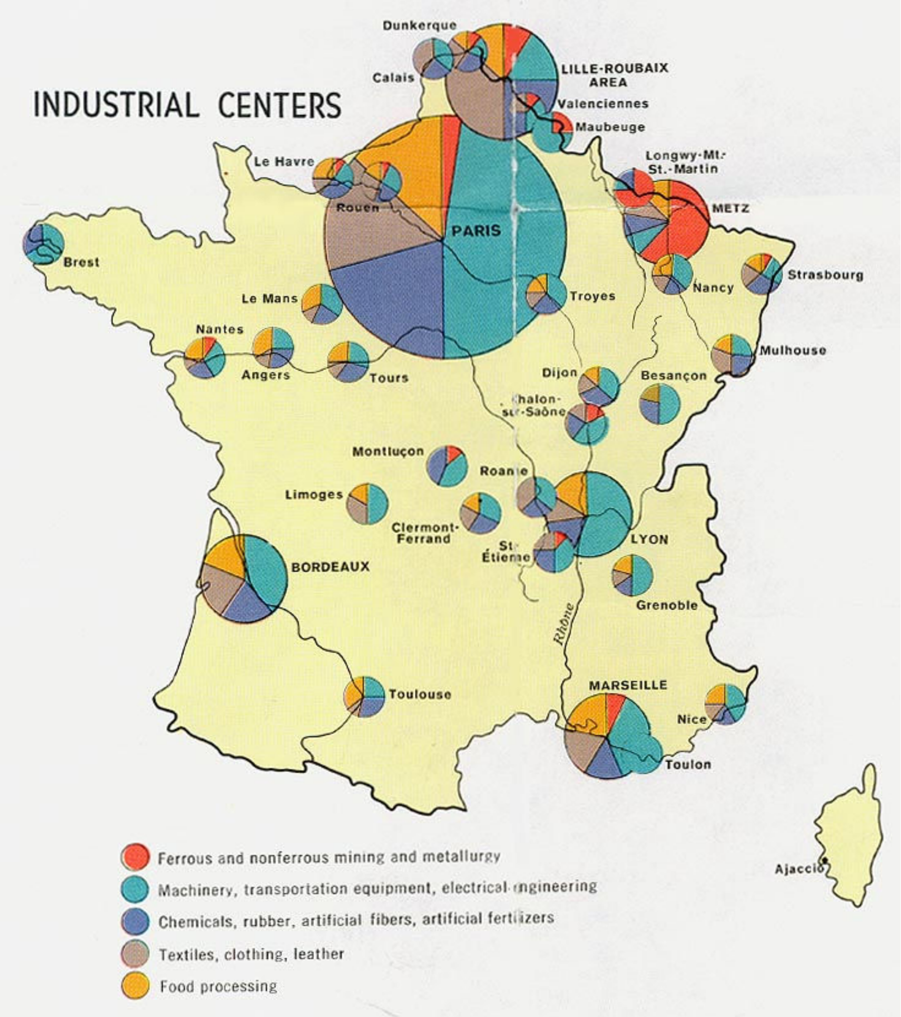
knowledge and know-how. Engineer schools and research organisms (Ecole Nationale Supérieure des Mines, ESINSA, ESSI, INRIA, INRA, Institut EURECOM, Institut Théseus, CERMICS, CERAM ESC Nice etc.) as well as training institutes (CNAM, CPA Méditerranée, GRETA Antipolis, Office international de l'eau), strengthen the strategic vision of Sophia Antipolis in the field of training. There are 66 institutions of higher education in the area. However, much of the research and technology efforts center on the following universities and national laboratories:

- University of Nice Sophia Antipolis
- National Center for Scientific Research
- National Institute for Agricultural Research
- National Institute for Computer Science Research
- Observatoire de la Côte d'Azur (astronomy)
- INSERM (medical and biotechnology)
- Ecole Nationale Supérieure des Mines de Paris
- CERMICS (mathematics)
- Institut EURECOM (communications and network engineering)
- CERAM (business management and administration)

HEALTH SCIENCE, CHEMISTRY & BIOTECHNOLOGY: The biotechnology, health and agrochemistry pole, gathers about sixty companies.The leading corporate names of these companies are : Rhone-Poulenc Agro, Dow Agrosciences, SmithKline Beecham Clinical Laboratories, Rohm and Haas, Dow Corning, NMT Neurosciences Implants S.A, Allergan Europe. The research is eminently presented by the Institut de Pharmacologie Moléculaire et Cellulaire (CNRS). The presence of these research centres and of these dynamo companies has launched the arrival of small and medium institutions attracted by the excellent interface (CNEVA Sophia Antipolis, Cird-Galderma, MXM Laboratories, FDM Pharma, Cerdic, Codan France, ElaiaPharm Laboratory, etc.). The European Cardiology Company set its registered office in the Park. ECOR, the European Heart House, welcomes the leading European heart specialists during the seminars and the information sessions. Numerous medical datas associate information and health new technologies.

GEO-SCIENCE: The fields of new energies, environment and geoscience employ 250 people, who work in public and private institutions and small and medium-sized companies. In the first two categories there are the Plan Bleu pour la Méditerranée, the ADEME, the CSTB, Geolab, IMRA Europe etc. Among the small structures, which focus on very specialized research, are Istar for stereo imaging applied to relief, ACRI for space and environment, SIGMA Consultants adviser in energy, environment, building business and new technologies, Geoimage for satellite or aerial picture processing applied to numerical cartography.

COMPUTER SCIENCE, NETWORKS & COMMUNICATIONS: The computer science, electronics and telecommunications pole accounts for 25% of the companies and nearly 50% of the jobs. You can notice the presence of a large number of famous French and foreign companies like Air France, Amadeus Development Company, Bouygues Télécom, ETSI, France Telecom, Matra Communication Sud, SEMA Group Télécom, Siemens, Atos Ingénierie Intégration etc. The density and the complementary nature of the companies are the core of the Club Telecom Valley. The Aérospatiale, IBM and Texas Instruments, settled near the Park, are also members of the Telecom Valley.

		
Availability of Finance and Investment Capital		The stock market plays a dynamic role in the global economic development. It ensures the financing, growth and internationalisation of high-potential companies whatever their fields including the biotechnologies, technical IT, high technology industries and services. An innovative SME cannot expect to develop a therapeutic products pipeline, become a world leader, and to be protected from being bought out by an overseas company, unless it is in a position to raise the tens or hundreds of million Euros necessary for its development on the stock market. As an example France only counts 6 listed biotechnology companies, compared to 46 in the United Kingdom and 310 in the United States, and no IPO has been undertaken in France in the biotechnology sector since 1999. We have experienced a similar situation in other technological sectors. **INCUBATOR PACA-EST:** Six companies have raised private funds totaling an estimated $14 million euros (one of 2.5 million and 2 of more than 3 million euros).

Resources and Incentives		**Government Funding:** France spends approximately $30 billion per year on research and development. CNRS, France's national center for scientific research (and the largest R&D lab in Europe) receives about $12 billion of the annual allocation. 15% of the world's patents are granted to French inventors. In 1997, France spent 2.2% of its GDP on domestic investment in research and development. During the same time period, the United States spent approximately $205.6 billion, or about 2.8% of GDP. In 1998, France granted 46,213 patents, 12,068 (or 26%) of which were to French inventors, while the United States granted 147,520 patents, 80,292 (or 54%) of which were to U.S. inventors. If you divide $30 billion by 12,068 and $205.6 billion by 80,292, you get $2.49 and $2.56 billion respectively. This tends to indicate that France and the United States receive approximately the same return on their R&D investments. **SOPHIA ALPES MARITIMES PROMOTION** *The regional economic development agency* Philippe SERVETTI - Marketing Director 400 Promenade des Anglais - BP 3185 06204 NICE CEDEX 3 - FRANCE Tel 33 (0)4 92 17 51 51 - Fax 33 (0)4 93 80 05 76 Email : servetti@cad.fr Web : www.investincotedazur.com Sophia Alpes Maritimes Promotion is the point of entry for investors and business owners who wish to access the economic, technological and institutional networks in the Alpes-Maritimes area in general and in particular Sophia Antipolis. It is a free, confidential and personalised service. **SAEM SOPHIA ANTIPOLIS CÔTE D'AZUR** *Company responsible for the development and commercial mission of the Sophia Antipolis science park and other departmental industrial development areas from time to time in other areas of the "département".* Jacques MASBOUNGI - Managing Director - masboungi@sophia-antipolis.net Christian CABROL - Commercial Manager - ccabrol@sophia-antipolis.net Place Joseph Bermond - BP 33 06901 SOPHIA ANTIPOLIS CEDEX Tel 33 (0)4 92 94 59 94 - Fax 33 (0)4 93 65 40 69 **France Biotech:** The French biotechnology association and the industry representative. Its mission is to contribute to position France and Europe as leaders in the Life sciences industry. France Biotech is acting on the four key factors of success for a strong biotechnology industry: ➢ improving the academic R&D dynamics and funding: France Biotech supported the SCI when it made a series of proposals including the creation of a National Science Agency, project accepted by the French government on June 2004,, and

the focusing of the Agency's budget on Life Sciences and Nanobiosciences

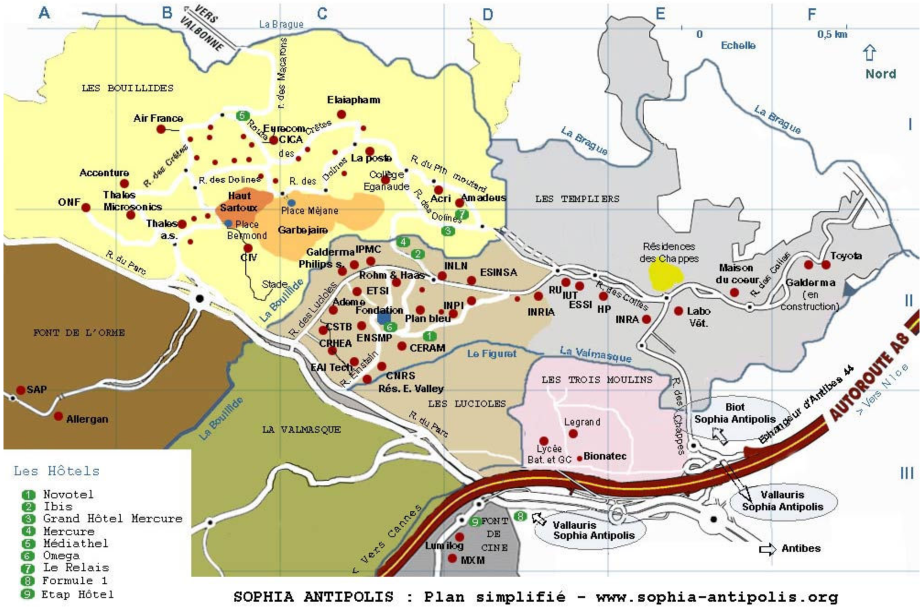
- ensuring a liquid chain of financing for young biotechnology companies (from seed funding to the stock market): France Biotech has designed and proposed, with the SCI, the status of *Jeune Entreprise Innovante* (Young Innovative Enterprise, JEI). The government implemented this law proposal on January 1st 2004, which now makes France the most attractive country for young research-driven companies and subsidiaries from a tax and social costs standpoint... More recently, France Biotech and a few other organisations of entrepreneurs and investors triggered an initiative that led to the commitment made by the Life insurance companies to invest an additional 6 billion euros in private equity. France Biotech is now proposing the government to provide fiscal incentives for investors that will invest in *Young Listed Enterprises, i*n order to prevent the lack of appetite encountered by young technology companies on the European stock markets.
- working on the manageurial environment within its through members networking, benchmarking activities, good practices sharing, etc.
- and lastly improving public perception: the association has organised in 2004 BioPicture Festival, the 1st international film and image festival on biotechnology, for conveying a positive image of life sciences among the general public. France Biotech gathers 150 members, representing most of the French biotechnology investments, pipeline and employees.

France Biotech
Angelita de Francisco
Tel : 01 56 58 10 70
contact@france-biotech.org

Strategic Council for Innovation: (Conseil Stratégique de l'Innovation or SCI) Founded in July 2002. It brings together a number of private and public opinion leaders in scientific research and corporate innovation: entrepreneurs, venture capitalists, former Ministers, CEOs of research institutes and agencies for innovation, researchers, economists and lawyers... Its main goal is to contribute to position France and Europe as leaders in scientific, technological and industrial innovation. In 2002, the SCI had designed and proposed to the FrenchPresident the law for the status of Jeune Entreprise Innovante (Young Innovative Enterprise, JEI). The government implemented this law proposal on January 1st 2004, which now makes France the most attractive country for young research-driven companies from a tax and social costs standpoint. The SCI made additional propositions including the creation of a National Science Agency, project accepted by the French government on June 29th. On September 7 2004, following the SCI proposal to the government, the life-insurers have committed to invest an additional € 6 billion in private equity to finance the development of young high-growth and high-potential companies, especially innovative companies.

INCUBATOR PACA-EST: Founded by the Universities of Nice-Sophia Antipolis and Toulon-Var, and by the INRIA and by the local Councils. The mission is to enhance and promote the performance of university laboratories and public research institutes through companies launching. Supported by the Region, the French Ministry of Research and the European Social Fund, it is part of an extensive national, regional and local network in favor of innovation development and technology transfer. Many others members are part of the creation of the incubator : CNRS, INSERM, INRA, CHU de Nice, Ecole des Mines de Paris, Institut Eurécom, Var Chamber of Commerce, Toulon Var Technologies, the Nice Agglomeration Community and Texas Instruments. The Incubator PACA-EST offers a supportive structure for scientists eager to start innovative new business. It provides support in training, advice and expertise until the start-up is launched on the market. Through July 31, 2004, 34 projects have been supported (either in ICT, engineer or life sciences), 17 companies have been launched (42 jobs created), and 6 companies have raised private funds (one of 2,5 million and 2 of more than 3 million euros).

Tenant Firms



SOPHIA ANTIPOLIS : Plan simplifié - www.sophia-antipolis.org

Tenant Firm Profiles

Seemage: Sophia Antipolis-based software publisher, that develops real time 3D software products and industrial equipment, has raised € 2,5 million with TechFund Capital Europe, 123Venture, Sophia Euro Lab and Primaveris during its first round of fundraising in 2004.

AMCC (Applied Micro Circuits Corporation): The California micro-electronics company has chosen the Côte d'Azur as the primary place to grow its French subsidiary. It is number one worldwide for the market of transmitter-receivers and high-speed optoelectronic switches.

Yachting Vill@ge, a new multimedia software developer, arrived in Sophia Antipolis in 2004. Founded in January 2004, the company develops multimedia applications for mobile Internet technologies, focuses on tourism and yachting

Eureka Soft and Voxpilot completed the merger announced in May 2004, forming a new company to be traded under the brand name **Voxpilot**. And Voxpilot opened sales offices in Sophia Antipolis to cover Southern Europe respectively.

The official inauguration of INRA's new 9,200 square-meter complex in Sophia Antipolis was held on Thursday, May 27. The Sophia Antipolis center is one of 21 regional centers across France comprising **the "Institut National de la Recherche Agronomique" (INRA)**, and the institute's largest building project to date. Research activities here focus on the health of plants and their relationship with the environment. Scientific projects study three major themes: plant-micro-organism interactions, responses of organisms to environmental stresses, and environmentally respectful methods of cultivation and integrated production. It now houses 225 permanent agents including approximately 100 researchers. Large enough to accommodate teams from INRA, UNSA, CNRS and INSERM, the building provides the ideal atmosphere for creative cross-fertilization.

In July 2004, **the Japanese group Sharp**, a world leader in consumer electronics and third in the Japanese mobile telephone market, joined the Eurécom Institute industrial consortium at Sophia Antipolis. After Hitachi in 1997, Sharp has been the second major Japanese electronics company to install a researcher at Eurécom in Côte d'Azur.

Early in 2004, **Alcatel Space** announced a €6 million project to install a new acoustic chamber at its facility in Cannes-La Bocca. In response to the increasing size of telecom satellites, Alcatel Space decided to build the new facility to enhance its competitive edge and control production cycles. With 8,700 square meters of connected clean space, Alcatel Space's Cannes facility is unique in Europe in its ability to maintain the "cleanliness chain" from the start of satellite production until delivery at the launch site.

In February 2004, **Temex** relocated its company headquarters from Sèvres to Sophia Antipolis. Temex designs and manufactures a broad range of standard and custom RF and Microwave products with various level of integration. The Sophia location is focusing on Temex filtering activities, in production as well as R&D.

Visteon Software Technologies SAS , in Sophia Antipolis, was created in 2004 by Visteon Corporation – a global leader in automotive systems, modules and components. The new company blends this expertise to develop a wide range of on-board and off-board vehicle navigation systems.

In January 2004, **Stepmind** secured investments of venture capital totaling €20 million - one of the largest fundraising efforts ever achieved in France. Founded in July 2000, Stepmind is a fabless microelectronics company specializing in high-speed wireless communications technologies.

In October 2004, **Axendo** inaugurated a new agency in Vence for the South of France. The Bologne-based company, official partner with both SAO and Cartesis, brings its expertise in IAS/IFRS, consolidation and reporting tools and information systems to the Côte d'Azur.

Nurtured in Eurécom since September 2003 and the PACA-East Incubator since October 2003, **INDIGEN Solutions** now introduces I.CMS (WebEditor Pro, WebPublisher and WebPublisher Avanced) to the public.

IBM opened in 2004 at its site in La Gaude a European test center specifically focused on RFID (Radio Frequency Identification), a technology expected to replace bar codes by 2009. La Gaude is IBM's third RFID test facility worldwide, after the U.S. and Japan.

Oracle EMEA and the Data Base Forum (MBDS) Casa Nova created an "Academic European Excellent Center" on wireless information services. The existing Casa Nova "academic showroom" in the World Trade Center in Sophia Antipolis was transformed into a "professional showroom," to visitors and seminars on wireless information systems.

Allyans, located in the International Center of Advanced Communication in Sophia Antipolis became Cisco's fourth training center in France, and the first such center outside the Paris region with the status of "Sponsored Organization".

In celebration of its 150th anniversary in 2004, family-owned fragrance company **Payan Bertrand** announced the opening of a second production facility in Sainte-Margerite in Grasse. The company is investing €300,000 in new equipment for the facility, dedicated exclusively to perfume blends.

Honeywell, which located its state-of-the-art European Data Center in Sophia

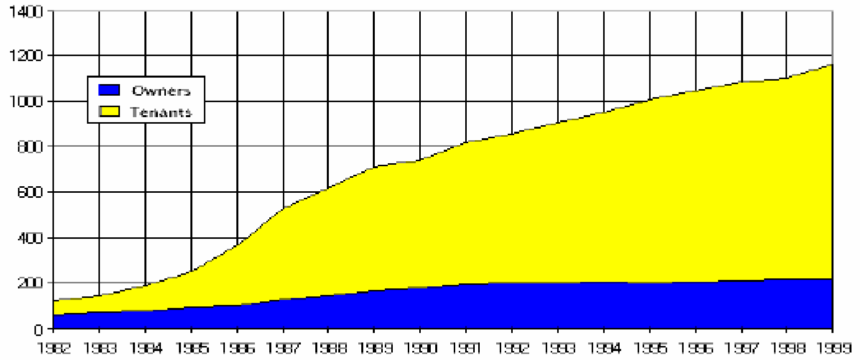
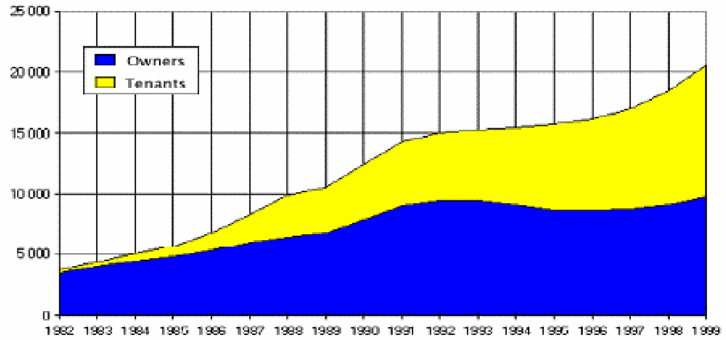
		Antipolis in 1997, is continuing to transfer the activities of national data centers in various European countries to its facility in the science park. In 2003 Its sophisticated Sophia site has become the European centre of this U.S.-based multinational company for a variety of key telecommunications, Internet and data base functions. In 2003 **Par'Fex**, a manufacturer of fragrance components , announced in 2003 the building of a new production facility and offices in Grasse totalling 2,700 m². The 2 million euro investment follows a 46,000 euro investment in 2002 in a robot which handles 40% of the 350 tons of compositions produced by the company. In 2003, **Spaceyes** has become a separate entity from the company GEOimage which has been based in Sophia Antipolis since 1989. It handles the editing of the GEOimage Mapping Workshop, a tool for the processing of Earth observation images, and provides a full range of software-associated services including training and maintenance. Spaceyes also proposes customized software development and integration, and the implementation of a software suite dedicated to "New Generation 3D". In 2002, Havas/Amercian Express located **its Pan European Travel Center of American Express** to become the first electronic reservation center in Europe for corporate travel.
Assessment of Success or Failure		Sophia Antipolis has been successful at growing the park in terms of the number of firms that either lease space or own their bldg. **Figure 6. Increase in numbers of firms**  *Source:* www.saem-sophia-antipolis.fr. Sophia Antipolis has also had great success creating jobs in the park.

Figure 7. Increase in numbers of jobs



Source: www.saem-sophia-antipolis.fr.

Assessment

The Sophia Antipolis Technopole was the first model of a “Science City” with a close-knit community providing all the necessary infrastructure and support for high-technology industry with university-linked research and development facilities, training centres, offices, professional associations, residential accommodation and hotels, as well as sport and leisure facilities. This model has been followed by the Japanese in their industrial “cities of the future”, and by the University of Edinburgh and the local authority in the Edinburgh Technopole.

Early evaluations of the Sophia Antipolis Technopole were not positive. In 1986, Perrin[127] dismissed the technopole as a “prestige park” for established multinationals that was not very successful in generating a mass of small enterprises and fostering cross-fertilization across the various enterprises. Quéré[128] saw it as lacking in the necessary “innovative milieu” and technological management, with the result that it was dominated by multinationals and state research centres.

A more recent judgement, taking into account the above evaluations, was given by Castells and Hall,[129] who admitted that “Sophia-Antipolis is a success at one level because it has worked: the park has been developed, it has brought in firms and jobs. But it has not so far worked at a deeper and more critical level, which is the creation of a true milieu of innovation: the necessary synergies are not yet richly developed. It may be a matter of time, more time perhaps than the two decades, so far, of life at Sophia-Antipolis… The verdict, as with other such developments, needs to be suspended.”

The numbers of small tenant enterprises increased spectacularly during the 1990s, and the multinationals and research centres are no longer dominant. Many of the very small firms are start-up firms that have to be innovative in order to survive.

Moreover, higher education and research activities have developed in response to the needs of firms in the park. Centres of expertise in ICTs and the life sciences have developed as a result of joint work by researchers in academic institutions and engineers in private industry, as well as the performance of young firms.

Crossed partnerships and financing between the Grandes Écoles and firms in the park or from outside have also contributed significantly to the development of research and teaching programmes that are increasingly specialized and internationally recognized.

It appears, then, that after three decades, Sophia Antipolis has matured sufficiently to have begun fulfilling its important mission in the area of innovation by creating small firms able to interact with established firms, universities and research centres, and thereby to harness the latest technologies for the generation of greater synergy and productivity in society at large. This, of course, is in addition to the technopole's earlier successes in creating jobs, bringing together academic and industrial partners and establishing an appropriate environment for interaction among universities, research centres and industry.

[126] See www.telecom-valley.fr.

[127] J.-C. Perrin, "Le phénomène Sophia-Antipolis dans son environnement regional," in P. Aydalot (ed.), *Milieux Innovateurs en Europe*, (Paris: GREMI, 1986), pp. 283-302. J.-C. Perrin, "Les P.M.E. de HT à Valbonne Sophia Antipolis," *Revue d'Economie Régionale et Urbaine*, 9 (1986), pp. 629-43.

[128] M. Quéré, *Sophia-Antipolis dans le Contexte Français* (Paris: GIP "Mutations Industrielles", 1990).

[129] M. Castells and P. Hall, *Technopoles of the World – The Making of Twenty-First-Century Industrial Complexes* (London: Routledge, 1994), pp. 85-93.

Source:
United Nations , 2001, ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA
TECHNOLOGY CAPACITY-BUILDING INITIATIVES FOR THE TWENTY-FIRST CENTURY IN THE ESCWA MEMBER COUNTRIES

KSFs or KFFs

Public policy

Concentration of firms (agglomeration)

Innovation and entrepreneurship

Summary of KSFs for Sophia Antipolis.

- Model of a "Science City" followed by the Japanese and Edinburgh University
- Not very innovative in the beginning, it has become an internationally recognized center
- Large number of start-up companies and new jobs
- Development of new specialized training and research programs
- Socio-professional associations and clubs

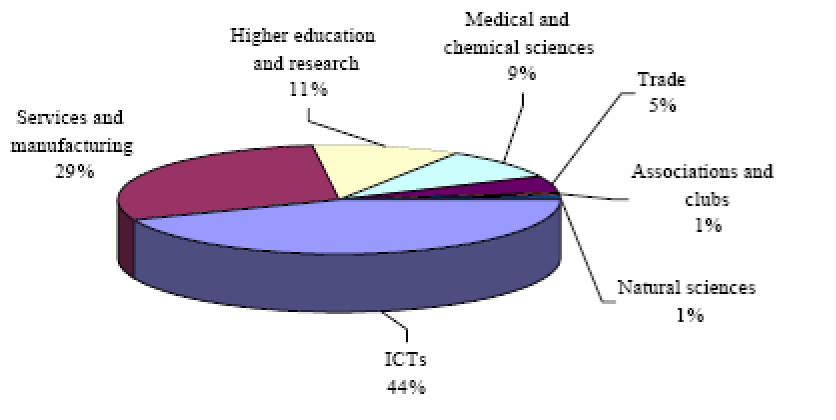
The institutions of higher education and public research located in the technopole have a total budget of 1.7 billion francs (nearly US$ 250 million at current rates). They execute over 400 contracts, valued at nearly 200 million francs (approximately US$ 30 million) every year. In 1999, these research and education institutions had approximately 3,500 permanent employees, including some 2,000 researchers, professors and PhDs.

SECTORS	*Institution*	*%*	*Jobs*	*%*
Information and Communications Technologies (ICT)	297	26%	8998	44%
Medical and Chemical Sciences (MCS)	53	5%	1920	9%
Natural Sciences (NS)	13	1%	228	1%
Higher education and Research (HER)	66	6%	2328	11%
Services / Manufacturing (S/M)	589	50%	5956	29%
Trade	121	10%	965	5%
Associations / Clubs (A/C)	25	2%	135	1%

Source: www.saem-sophia-antipolis.fr

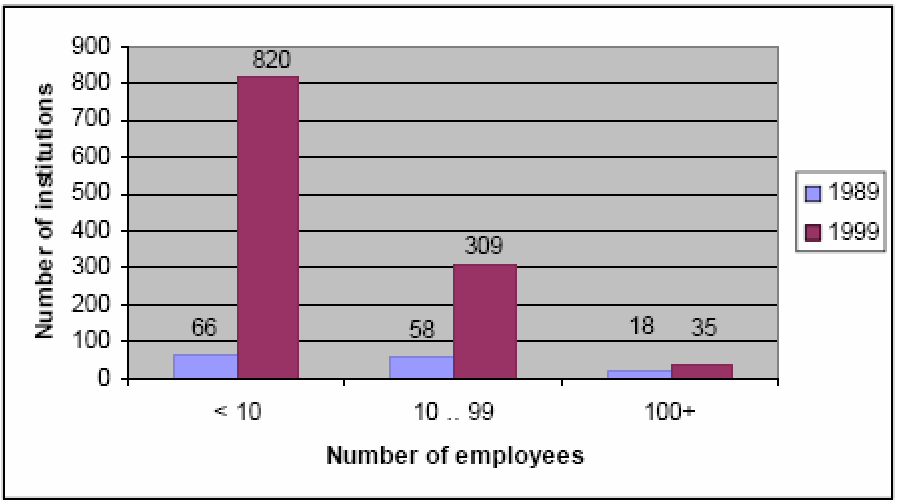
Some 1,200 firms employing nearly 21,000 engineers and technicians, as well as a university, engineering schools and research centres with 5,000 researchers and students are currently located in this park.

Figure 4. Distribution of jobs by sector



More small firms are attracted to, and are starting up or relocating to the park.

Figure 5. Classification of institutions by number of employees



Telecommunications Infrastructure

Firms and other institutions with premises in Sophia Antipolis have the use of a **state-of-the-art telecommunications network** which relies on an **optical fibre infrastructure** and is based on SDH optical technology. This means that services such as videoconferencing, digital video transmission, advanced company communication services or fast Internet access are at their disposal. Since 1996, Sophia Antipolis has also had an asynchronous transfer mode (ATM) platform offering a rate of 155Mbps.

Socio-professional associations and clubs

The Sophia Antipolis Foundation, established in 1984, has responsibility for a fundamental mission in the technopole, namely the stimulation of scientific and cultural activity through a variety of socio-professional associations, clubs and programmed activities focusing on innovation.

Telecom Valley is one such association. Its members are institutions operating in the telecommunications field, whether in research and development, production, training or consulting. Its aim is to facilitate the exchange of knowledge within the Sophia Antipolis community, attracting new ICT partners, promoting the capabilities of its members, establishing an international presence by organizing high-quality technology-related events and co-operation programmes with similar associations, and providing its members with advice.[126]

The Sophia Start-up Club comprises over 200 actors in the new economy, including professionals with ideas for projects, investors and venture capitalists. The members hold regular meetings to discuss potential projects and implement those that seem promising in terms of future start-ups.

The Foundation also provides training aimed at helping SMEs manage their human resources, innovations and new technologies. Another activity is a series of seminars designed to enable the employees of the various firms to keep their skills finely honed by updating their knowledge.

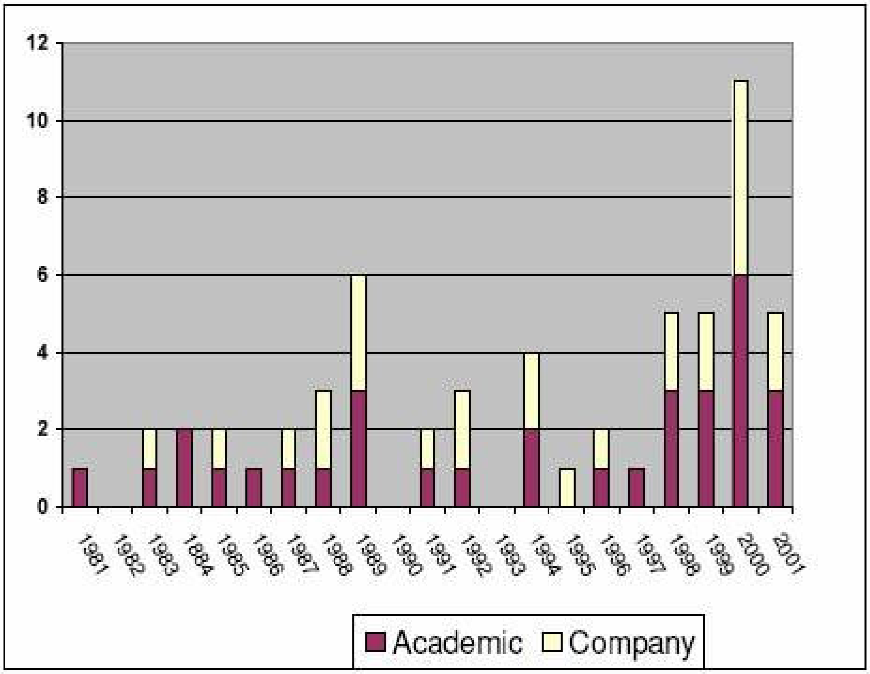
Government

Political backing for S and T initiatives at the national and local levels provides essential impetus by removing obstacles and creating a more fertile decision-making environment. In the absence of such backing, many thriving initiatives, such as Sophia Antipolis in France and others in Great Britain, would never have come into being;

Slso, additional information about high spin-off activity from Sophi Antipolis. Source: Bernasconi, Michael, Dominique, Jolly R., 2003, The Size and the Characteristics of the High-tech Spin-Off Phenomenon in Sophia Antipolis.

Spin Off

This research represents a unique attempt to offer a longitudinal study of spin-off phenomena in the techno park of Sophia Antipolis. It gives a first quantitative appreciation of the global phenomenon and better understanding of the spin-off development. Three periods were distinguished: the creation of the science park (prior to 1990) which resulted in a positive dynamic and spill-over effect; the economic turnaround (1991-1994) which produced social spin-offs, and finally, the re-launch (1995-2001) which created a new dynamic.

		 Figure 1 – Evolution of spin-off creations (1981-2001) in Sophia Antipolis Source: United Nations , 2001, ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA TECHNOLOGY CAPACITY-BUILDING INITIATIVES FOR THE TWENTY-FIRST CENTURY IN THE ESCWA MEMBER COUNTRIES

A1.3.2 Adlershof Technology Park, Germany

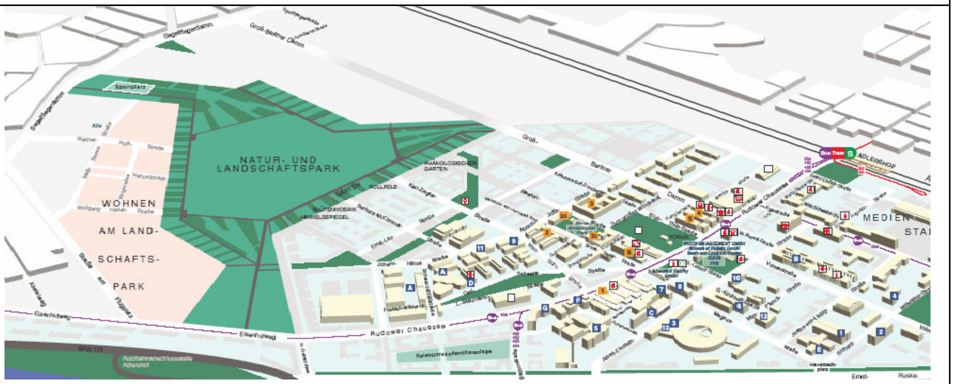
1		PROFILE INFORMATION
Common Name of Technology Park		Adlershof Science and Technology Campus
Location		Rudower Chaussee 17 12489 Berlin Germany
Phone		+49 (0) 30 / 6392-1930
Email address		info@adlershof-projekt.de
Formal park Name		Berlin Adlershof Science and Technology Campus
Address Line 1		Rudower Chaussee 17 12489 Berlin Germany
Address Line 2		
Fax		+49 (0) 30 / 6392-1931
Primary Focus		Life Sciences, Biotech, Pharma
Principal Owner/Investor		**WISTA-MANAGEMENT GMBH Germany**
Background		Adlershof is a traditional location for extramural research in Berlin. Way back in the 1930s the facilities of the German Aeronautical Research Institute were established here. Today, the 12 Non University Research Institutes in Adlershof concentrate on the research areas: - New material and processes - Optical technologies - Information and communication technology and environmental research. 1. **ACA** Institute for Applied Chemistry Berlin-Adlershof www.aca-berlin.de 2. **BAM** Federal Institute for Materials Research and Testing www.bam.de 3. **BESSY** Berliner Elektronenspeicherringgesellschaft für Synchrotronstrahlung mbH (Berlin electron storage ring company for synchrotron radiation) www.bessy.de

		4. **BTU** Brandenburg University of Technology, Working Group Atmospheric Chemistry www.luft.tu-cottbus.de 5. **DLR** The German Aerospace Center, Institute of Space Sensor Technology and Planetary Exploration www.dlr.de/Berlin 6. **FBH** Ferdinand-Braun-Institut für Höchstfrequenztechnik www.fbh-berlin.de 7. **FIRST** Fraunhofer Research Institute for Computer Architecture and Software Technology www.first.fraunhofer.de 8. **HMI** Hahn-Meitner-Institut Berlin, Department Silicon Photovoltaics www.hmi.de/bereiche/SE/SE1/ 9. **IKZ** Institute of Crystal Growth www.ikz-berlin.de 10. Institute for Analytical Sciences**.** www.isas-berlin.de 11. **MBI** Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy www.mbi-berlin.de 12. **PTB** Physikalisch-Technische Bundesanstalt, Photon Radiometry Department www.ptb.de
Vision		The core of the City for Science, Technology and Media is a science and technology park, that today already ranks as one of the 15 largest in the world. It already covers and area of 81 ha. Business and extramural scientific institutes work towards innovative products and services in the following fields of technology: 1. Photonics and Optical Technologies 2. Information and Media Technology 3. Materials and Micro-system 4. Environmental, Bio, and Energy technology. The Innovation and Business Incubation Centre (IGZ) offers enterprise founders a broad spectrum of support services both in a supportive consulting realm, and also providing a technical-organizational infrastructure and adequate premises for the development of new enterprises.

		Since September 1991, the Innovation and Business Incubation Centre (IGZ) has offered enterprise founders, young enterprises with new and innovative technology-oriented projects and services, as well as established enterprises with temporarily-limited innovation projects, a broad spectrum of support services both in a supportive consulting realm, and also providing a technical-organizational infrastructure and adequate premises for the start-up and development of new enterprises here in Adlershof. In the IGZ buildings, in which there is approximately 16,500 m² of space for rent with multi-functional capabilities for use, at present there are 72 young enterprises in different fields of technology. The company operating the IGZ is the Innovation Centre Berlin Management GmbH (IZBM), a subsidiary of the Berlin Business Development Corporation (BBDC). The OWZ - International Business Incubator supports the founding and settling of multinational enterprises from all over the world, particularly from Central and Eastern Europe who want to realize their cooperative business activities locally from Berlin.
Mission		Berlin Adlershof is one of the most successful development projects in the eastern part of Germany. Since 1991, an integrated science, technology and media location has developed here on an area of 4.2 square kilometres (1,038 acres), embedded in an overall urban planning concept. The mission of The goal: a modern city structure with the "Science City" at its centre, surrounded by a Media City, an industrial park, and residential areas. The construction of the first single family houses began in 2004. The new quarters developed around a huge landscape park, which was developed from the former Johannisthal airfield. It will soon be home to Berlin's first thermal-spa. Fiduciary company responsible for development since 2003 was the *BAAG, Berlin Adlershof Aufbaugesellschaft mbH*. On January 1st 2004 WISTA-MANAGEMENT GMBH, replaced BAAG with Adlershof Projekt GmbH, as the new overall development authority for Adlershof.
Location		In the south-east of Berlin, a new city district is being created over an area of 1,038 acres: "Berlin Adlershof - City of Science, Technology and Media". It has already acquired an international reputation for its research results, products and services. It

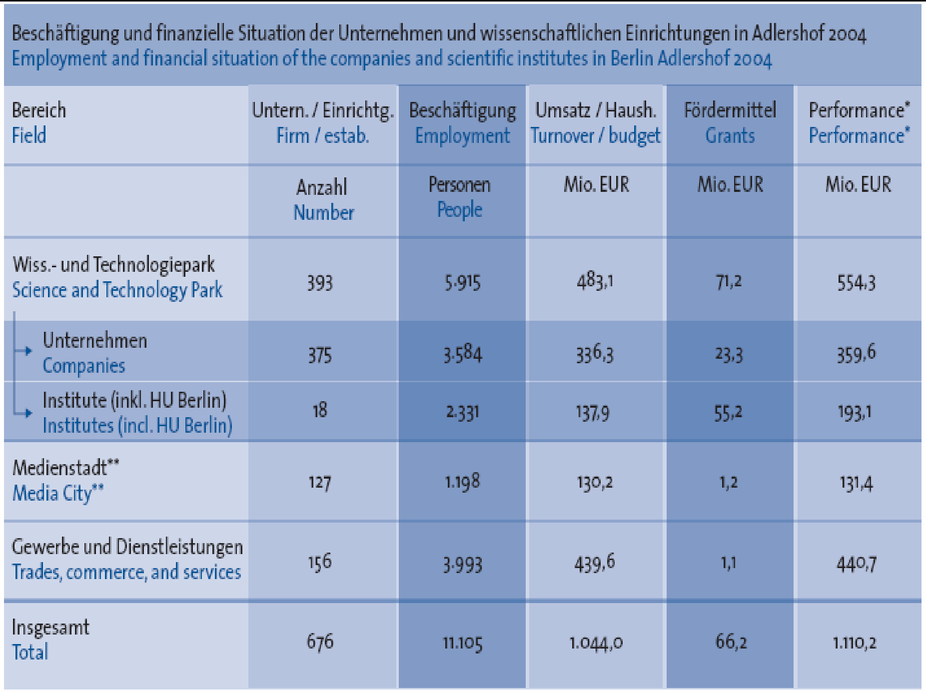
		provides an innovative mixture of future-oriented businesses and scientific institutes. City of Science, Technology and Media Area: 420 hectares (1,040 acres) Staff: approx. 11.000 Enterprises: 658 Science and Technologu Park **Investments** 1991 - 2007: EUR 2.5 - 3 billion **Status of Development** New settlements 2003: 69 companies New settlements 2004: 62 companies Turnover of the companies and funds of the scientific institutes: EUR 554 Mio. **Companies** 375 innovative companies, approx. 3,580 staff **Scientific Institutes** 12 non-university research institutes with around 1,500 employees, among them 672 scientists as well as 130 doctorate students and guests **Humboldt-University of Berlin** 6 natural science institutes (Institute for Computer Science, Mathematics, Chemistry, Physics, Geography and Psychology), 130 professors, approx. 7,000 students and 900 other staff
Facilities		the centre lies the 26 hectares **nature park**, which protects the area of the "former Johannisthal airfield". Since the closing of the former airfield in the 40's, fallow and nature once again have taken root there. Rare, protect-worthy biotopes have formed. The preserve is enclosed by a boardwalk allowing the park visitor to view it from a distance. Between boardwalk and future construction areas lies the **active park** of approximately 30 city gardens. Visitor use can be concentrated in these city gardens. The recreational area is already today the meeting place for inline and skaters from the surrounding residential districts. The **landscape park** is in classical English landscape architecture style with open meadows and groups of trees from

		oaks and pines. One can either walk through or pause and simply enjoy nature. The total concept for the park shows, how conservation and urban recovery can be interconnected. The complex future task will be to secure the free space qualities reached so far despite the limited means for care of green areas and maintenance with the market's free hand. The care of the lawn with sheep worked satisfactorily, but further and perhaps more unusual lawn-care concepts are to follow. Such care is left to the non-profit promotional association
Services		**Services** Real Estate section: For information regarding office-, laboratory- or factory space check out our **Online Database** Phone number for Real Estate Services: 49-0-30-6392-6392 Or send an Email: • immobilien@adlershof.de International Services for clients setting up operations in the park: Find more information at the International Office of WISTA-MANAGEMENT GMBH and at the EURO-OFFICE initiative Contact WISTA-MANAGEMENT GMBH, Rudower Chaussee 17, 12489 Berlin **Dr. Helge Neumann** International Office Phone: +49 (0) 30 / 6392-2231 Fax: +49 (0) 30 / 6392-2204 Email: helge@wista.de ▪ communication and marketing ▪ settlement of companies

		- acceleration of business startups - grants and advice for businesses - internal networking, as well as special networking contributions
Price/Rent		**Price / Rent** The office rental depends on the occupancy rate and other seasonal factors. In order to get up to date rental information regarding the office space you can contact: Facility Management: Information on technical questions, infrastructure or utilities provides Adlershof Facility Management GmbH. Contact Adlershof Facility Management GmbH Kekuléstr. 4, 12489 Berlin **Rolf Dieter Schlaubitz** CEO AFM-GmbH Phone: +49 (0) 30 / 6392-1930 Fax: +49 (0) 30 / 6392-1931 Email: schlaubitz@afm-gmbh.de
Map of Tech Park		 **Complete map location:** **http://www.adlershof.de/fileadmin/downloads/anfahrt/oplan_kompl_2005.pdf** **http://www.adlershof.de/fileadmin/downloads/anfahrt/oplan_2005.pdf**
Principal		Photonics and Optical Technologies

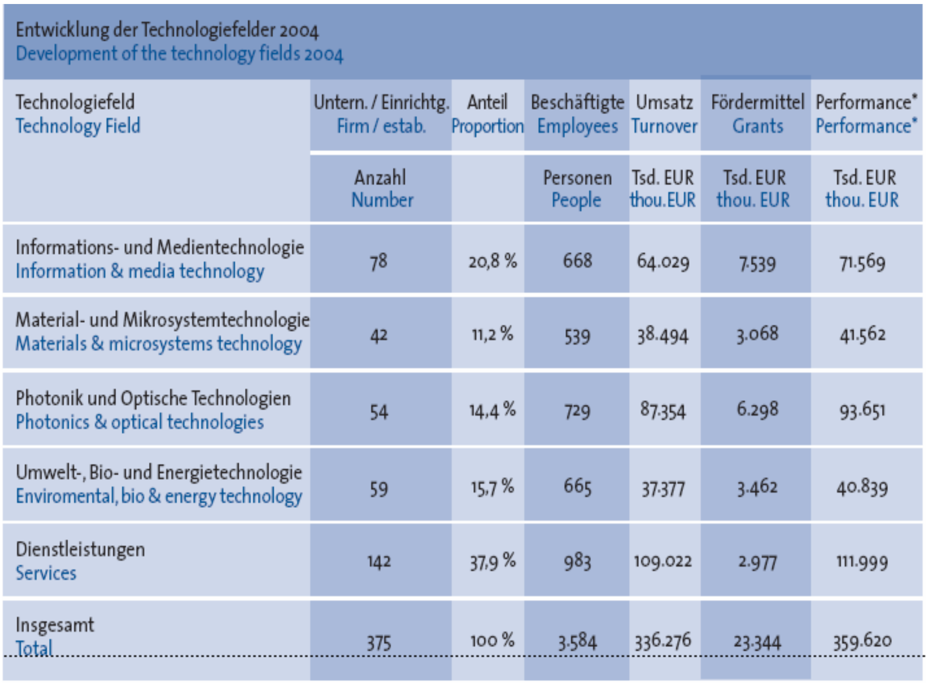
Technologies in Tech park		Photonics and optical technologies for Biotechnology applications, communication and telecommunication applications and applied physics applications Information and Media Technology In the Science and Technology Park Berlin Adlershof, there is currently a broad array of about 100 actively operating information technology and media technology companies. The areas of expertise include: Multimedia Drafting and design support, Software technology, and Production planning systems. About 630 people are employed in the information technology firms. In 2002, sales of 66 million € were achieved. Firms here belonging to the field of IT include, among others, Rohde & Schwarz SIT GmbH, Controlware GmbH, ADVA Optical Network AG und INIT Innovative in Transport-, Verkehrs- und Leitsystemen GmbH. Materials and Microsystems Technology In the Science and Technology Park Berlin Adlershof there are currently about 50 active companies in the fields of Materials and Microsystems Technology. They employ approximately 600 people. Highperformance cooperation partners, like the research facilities "Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung m.b.H." (Berlin electron storage ring company for synchrotron radiation), BESSY, and the Institute of Crystal Growth (IKZ) offer firms in Berlin Adlershof attractive development possibilities. Microsystems technology has established as a new technology field in Berlin Adlershof based on the cooperation of companies and institutes. Six Berlin research institutes settled their facilities here in Adlershof as the Centre of Microsystems Technology (ZEMI). This centre gives the companies and institutes technical support for development, manufacturing, and testing of microsystems products. Environmental, Bio-, and Energy Technology In the Science and Technology Park Berlin Adlershof, 60 environmental, bio-, and energy technology companies have settled to date, including Dräger Safety AG & Co. KgaA, I.U.T. Institut für Umwelttechnologien GmbH, Scienion AG and Capsulution NanoScience AG.

		The main focuses of these companies are: ▪ water, soil, and air analytics ▪ biotechnological products and technology for pharmacy and medicine ▪ new analytical technologies and equipment ▪ technological development for sustainable management of all kinds of resources ▪ development of non-polluting construction materials ▪ implementation of energy saving technologies for waste management and utilization There are 11,539 m² of high quality floor space for chemical, microbiological, and physical laboratories, offices and production areas in units from 20 up to 1,000 m² available for companies. The firms cooperate with numerous scientific institutes. The Institute of Applied Chemistry Berlin Adlershof e. V. (ACA) focuses its activities on fundamental and applied research of heterogeneous catalysis with application in refinery, material science, environmental technologies, and automotive industry. The Federal Institute for Material Research and Testing (BAM) concentrates its research activities on the validation of analytical methods with respect to chemical analysis of water, waste water, and waste. The Institute for Analytical Sciences features core competence in the development and validation of analytical methods and strategies and technical equipment. The Institute of Chemistry of the Humboldt University of Berlin, which has been located in Adlershof since 2001, is further strengthening this field of technology.
Production, Revenues and Export Statistics		Berlin-Adlershof is among the 15 biggest scientific and technological parks world-wide and is a trend-setting institution in the collaboration of university facilities and non-university research and economic corporations. Currently, 5,500 employees work in 357 enterprises and research facilities; approximately one half of all enterprises are recent start-ups.



Beschäftigung und finanzielle Situation der Unternehmen und wissenschaftlichen Einrichtungen in Adlershof 2004
Employment and financial situation of the companies and scientific institutes in Berlin Adlershof 2004

Bereich Field	Untern. / Einrichtg. Firm / estab.	Beschäftigung Employment	Umsatz / Haush. Turnover / budget	Fördermittel Grants	Performance* Performance*
	Anzahl Number	Personen People	Mio. EUR	Mio. EUR	Mio. EUR
Wiss.- und Technologiepark Science and Technology Park	393	5.915	483,1	71,2	554,3
→ Unternehmen Companies	375	3.584	336,3	23,3	359,6
→ Institute (inkl. HU Berlin) Institutes (incl. HU Berlin)	18	2.331	137,9	55,2	193,1
Medienstadt** Media City**	127	1.198	130,2	1,2	131,4
Gewerbe und Dienstleistungen Trades, commerce, and services	156	3.993	439,6	1,1	440,7
Insgesamt Total	676	11.105	1.044,0	66,2	1.110,2



Entwicklung der Technologiefelder 2004
Development of the technology fields 2004

Technologiefeld Technology Field	Untern. / Einrichtg. Firm / estab.	Anteil Proportion	Beschäftigte Employees	Umsatz Turnover	Fördermittel Grants	Performance* Performance*
	Anzahl Number		Personen People	Tsd. EUR thou. EUR	Tsd. EUR thou. EUR	Tsd. EUR thou. EUR
Informations- und Medientechnologie Information & media technology	78	20,8 %	668	64.029	7.539	71.569
Material- und Mikrosystemtechnologie Materials & microsystems technology	42	11,2 %	539	38.494	3.068	41.562
Photonik und Optische Technologien Photonics & optical technologies	54	14,4 %	729	87.354	6.298	93.651
Umwelt-, Bio- und Energietechnologie Enviromental, bio & energy technology	59	15,7 %	665	37.377	3.462	40.839
Dienstleistungen Services	142	37,9 %	983	109.022	2.977	111.999
Insgesamt Total	375	100 %	3.584	336.276	23.344	359.620

Availability of Human Capital	. **High-school educated labor force:** 100% of Labor Force . **Literate labor force:** 100% . **College-educated labor force, including the technical high schools:** 90%

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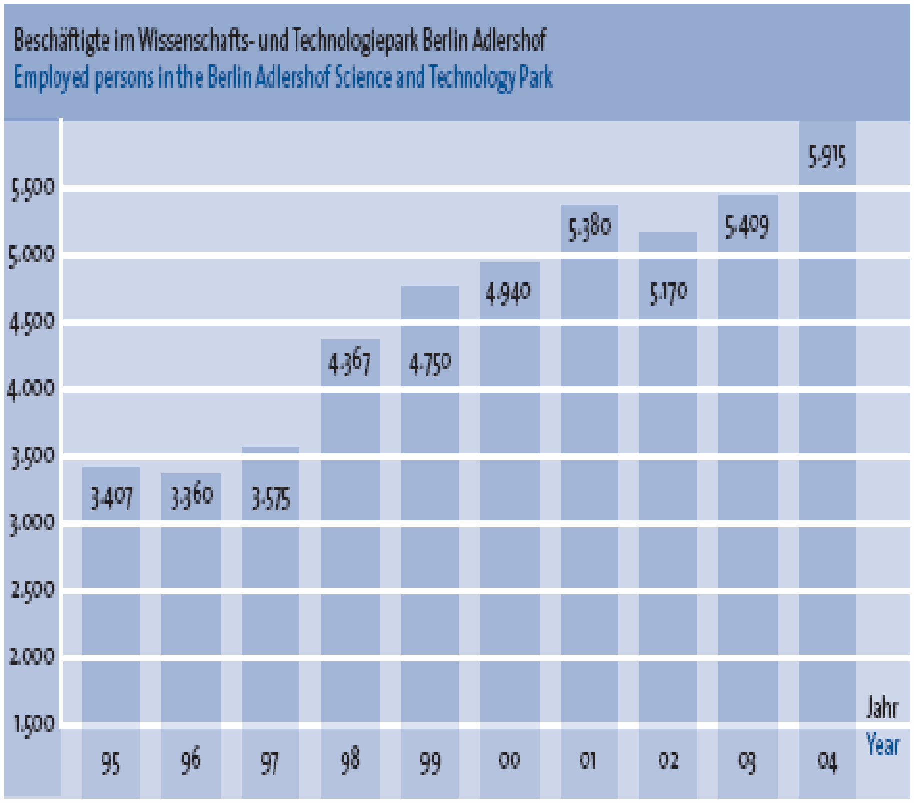
Scientists and engineers: 50%

Degree granted per year in country/region by specialty:

~ 7000



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<tr>
<td>Availability of Finance and Investment Capital</td>
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There are not much Venture capital financing the companies the park. Most of the Financing is coming from the private Equities and large bank:

- 10% financed through the VC. 50M-60M Euro
- 90% financed through large banks and private equities. 500M-600M Euro

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<tr>
<td>Resources and Incentives</td>
<td></td>
<td>Since the park is located in the Easter part of Germany both the Fedral Gov and EU commission and launched infrastructure developments and educational programs to integrate this region with the rest of the German Economy.</td>
</tr>
</table>

Regional Production System Linkages		Patrnership with different tech parks. 
Tenant Firms		Photonics and Optical Technologies **A.L.S. Advanced Laser Diode Systems GmbH** Schwarzschildstraße 6 - 12489 Berlin Tel: 030-6392 6525 **A.R.T. Photonics GmbH Advanced Research & Technology in Photonics** Schwarzschildstraße 6 - 12489 Berlin Tel: 67 89 41 53, Fax: 67 89 41 56 **Advanced Photonic Systems GmbH** Schwarzschildstraße 6 - 12489 Berlin Tel: 6392-6520, Fax: 6392-6521 **AEMtec GmbH** Carl-Scheele-Straße 16 - 12489 Berlin Tel: 63 92 73 00, Fax: 63 92 73 02

ATN Automatisierungstechnik Niemeier GmbH
Schwarzschildstraße 1 - 12489 Berlin
Tel: 6392-2150, Fax: 6392-2154

AZURA LASER AG
Schwarzschildstraße 1 - 12489
Berlin
Tel: 6392-3111, Fax: 6392-3110

Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung mbH BESSY II
Albert-Einstein-Straße 15 - 12489 Berlin
Tel: 6392-2999, Fax: 6392-2920

BESTEC GmbH UHV-Technik-LASER-Sensorsysteme
Carl-Scheele-Straße 14 - 12489 Berlin
Tel: 677 43 76, Fax: 6 77 57 18

Bober - Optosensorik und Meßtechnik GbRmbH
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6095, Fax: +49(0)30 6392 6098

BST International GmbH
Schwarzschildstraße 12 - 12489
Berlin
Tel: 6392-5225, Fax: 6392-5226

C2GO inprocess solutions
Schwarzschildstraße 1 - 12489
Berlin

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Standort Berlin
Rutherfordstraße 2 - 12489 Berlin
Tel: +49(0)30 67055 101, Fax: +49(0)30 67055 102

eagleyard Photonics GmbH
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 4521, Fax: +49(0)30 6392 4529

EuroPhoton-Gesellschaft mbH für Optische Sensorik
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6301, Fax: +49(0)30 6392 6302

Ferdinand-Braun-Institut für Höchstfrequenztechnik im Forschungsverbund Berlin e. V. (FBH)
Gustav-Kirchhoff-Straße 4 - 12489 Berlin
Tel: 030/6392-2610, Fax: 030/6392-2602

Environmental, Bio-, and Energy Technology

ACA Institut für Angewandte Chemie Berlin-Adlershof e. V.
Richard-Willstätter-Straße 12 - 12489 Berlin
Tel: 6392-4444, Fax: 6392-4454

ACI ANALYTICAL CONTROL INSTRUMENTS GmbH
Volmerstraße 9 A - 12489 Berlin
Tel: 6392-5466, Fax: 6392-5465

ANiMOX GmbH
Volmerstraße 5 - 12489 Berlin
Tel: 030-6392 1040, Fax: 030-6392 1042

ASCA GmbH Angewandte Synthesechemie Adlershof
Richard-Willstätter-Straße 12 - 12489 Berlin
Tel: 6392-2070, Fax: 6392-4103

AZBA Analytisches Zentrum Berlin-Adlershof GmbH
Volmerstraße 9 A - 12489 Berlin
Tel: 6392-2125, Fax: 6392-3267

BIOPRACT GmbH
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6205, Fax: +49(0)30 6392 6206

BIOWORX Biotechnologielabor -Thomas Grimm-
Volmerstraße 5 - 12489 Berlin
Tel: +49(0)30 6392 1041, Fax: +49(0)30 6392 1042

Brandenburgische Technische Universität Cottbus, AG Luftchemie
Volmerstraße 13 - 12489 Berlin
Tel: 6392-5651, Fax: 6392-5654

Bundesanstalt für Materialforschung und -prüfung (BAM)
Richard-Willstätter-Straße 11 - 12489 Berlin
Tel: 8104-0, Fax: 8104-5790

Büro für Umweltplanung (BFU)
Volmerstraße 9 - 12489 Berlin
Tel: 6392-6330, Fax: 6392-6334

Capsulution NanoScience AG
Volmerstraße 7 B - 12489 Berlin
Tel: (030) 6392 3600, Fax: (030) 6392 3601

Dionex GmbH
Volmerstraße 5 - 12489 Berlin
Tel: 06126-991-0, Fax: 06126-991-227

Dr. Hettler & Partner Ingenieur- und Consultingbüro
Volmerstraße 7 B - 12489 Berlin
Tel: 6392-7050, Fax: 6392-7051

Dr. Lerche KG
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6780 6050, Fax: +49(0)6780 6056

Dr. Marwan Chemie, Forschung & Entwicklung

Information and Media Technology
Accelant Communications GmbH
Oranienburger Chaussee 40 - 16548 Glienicke/Nordbahn

ACP Software GmbH
Albert-Einstein-Straße 14 - 12489
Berlin
Tel: 6392-3186, Fax: 6392-3187

**adisoft systems GmbH & Co.
KG**
Rudower Chaussee 25 - 12489
Berlin
Tel: 030 6392 6530

ADVA AG Optical Networking
Justus-von-Liebig-Straße 7 - 12489
Berlin
Tel: 67 00 80, Fax: 67 00 81 08

ALPHA MATRICS Industriewerbung
Albert-Einstein-Straße 14 - 12489
Berlin
Tel: 030 - 6789 2290, Fax: 030 - 6789
2291

AlphaContec Consulting & Services GmbH
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 3321, Fax: +49(0)30 6392
3320

Andor Technology
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6051, Fax: +49(0)6392
6010

Andover Controls GmbH
Albert-Einstein-Straße 16 - 12489
Berlin
Tel: 030 - 6392 5871, Fax: 030 - 6392
5873

asis Soft- und Hardware GmbH
Albert-Einstein-Straße 14 - 12489
Berlin
Tel: 6392-4916, Fax: 6392-4917

atech GmbH
Albert-Einstein-straße 16 - 12489
Berlin
Tel: +49(0)30 6392 3825

AUCONET GmbH
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6880, Fax: +49(0)30 6392
6898

Automatisierungstechnik Peter Racz
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 6173, Fax: +49(0)30 6392
6173

bc sales
Albert-Einstein-Straße 14 - 12489
Berlin
Tel: 01803 / 894 5806

BENUS IT - Service AG
Volmerstraße 9 - 12489
Berlin
Tel: 5360-660, Fax: 5360-
6611

bercom Kommunikationstechnik GmbH
Carl-Scheele-Straße 12 - 12489 Berlin
Tel: 63 99 090, Fax: 63 63 359

Materials and Microsystems Technology
A.S.T. Leistungselektronik GmbH
Brook-Taylor-Straße 10 - 12489
Berlin
Tel: 6392-5700, Fax: 6392-5709

Agere Systems Deutschland GmbH & Co. KG
Rudower Chaussee 29 - 12489 Berlin
Tel: +49(0)30 6392 5370, Fax: +49(0)30 6392
5373

AMIC Angewandte Micro-Messtechnik GmbH
Volmerstraße 9B - 12489 Berlin
Tel: +49(0)30 6392-2540, Fax: +49(0)30 6392-2541

ASI Advanced Semiconductor Instruments GmbH
Rudower Chaussee 30 - 12489 Berlin
Tel: +49(0)30 6392 5045, Fax: +49(0)30 6392 5041

ASTRO- UND FEINWERKTECHNIK ADLERSHOF GMBH
Albert-Einstein-Straße 12 - 12489 Berlin
Tel: 6392-1000, Fax: 6392-1002

BBPT Gesellschaft für physikalisch-technischen Gerätebau mbH
Albert-Einstein-Straße 5 - 12489 Berlin
Tel: 6392-5020, Fax: 6392-5021

CLOOS Schweißtechnik GmbH
Volmerstraße 9 B - 12489 Berlin
Tel: 6780678-0, Fax: 6780678-25

Deutsche Gesellschaft für Zerstörungsfreie Prüfung e. V. (DGZfP)
Max-Planck-Straße 6 - 12489 Berlin
Tel: 67 807-101, Fax: 67 807-109

Dr.-Ing. Rainer Heyer Werkzeugtechnik GmbH
Barbara-McClintock-Straße 11 - 12489 Berlin
Tel: 6392-5192, Fax: 6392-5199

Enz-Ingenieurbüro für Umweltelektronik & Automatisierung
Friedrich-Wöhler-Straße 2 - 12489 Berlin
Tel: 030 - 6392-5280, Fax: 030 - 677 46 29

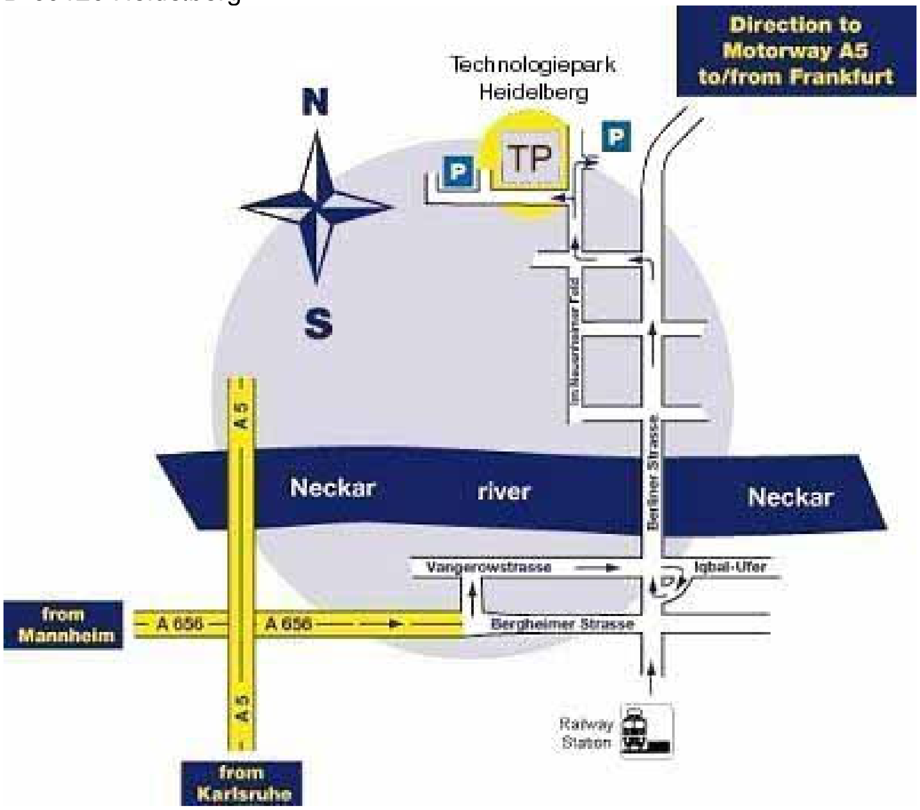
		FMB Feinwerk- und Meßtechnik GmbH Friedrich-Wöhler-Straße 2 - 12489 Berlin Tel: 67 77 30-0, Fax: 67 7730-40 **Fraunhofer Institut für Produktionsanlagen und Konstruktionstechnik** Volmerstraße 7 A - 12489 Berlin Tel: 6392-3960, Fax: 6392-3962 **Fraunhofer IZM Branch Lab, Microsystem Engineering** Volmerstraße 9 A - 12489 Berlin Tel: 6392 8179, Fax: 6392 8162 **GEVA Gesellschaft für Entwicklung und Versuch Adlershof mbH** Friedrich-Wöhler-Straße 1 - 12489 Berlin Tel: 6392-7410, Fax: 6392-7470 **Hymite GmbH** Carl-Scheele-Straße 12 - 12489 Berlin Tel: 6782 6011
Assessment of Success or Failure		This park is one of the most successful parks in EU. It is diverse park with supporting technology work force and universities in surrounding region to provide the intellectual capital.
KSFs or KFFs		Availability of skilled labor Availability of graduate degree program Nature of industrial relations Cost of labor Existence of higher education institutions

		Central government funding Traditional capital Cost of funding Commercial financing Local government International funding Availability of land Availability of flights and airports Quality of telecommunications service Cost of telecommunications service Quality and miles of roads Connections to sea Hotels & tourism infrastructure Reliable supply of power Modern communications infrastructure Availability of health care system Based on the secondary literature review relative to the Adlershof and Heidelberg Technology Parks, and the set of factors in the GLOINTECH model the key success factors appear to be: ▪ Factor Conditions -> Availability & Quality of Labor -> Availability of Skilled Labor. ▪ Firm Strategy and Rivalry -> Existence of Industry Leading Firms ->

		Proximity to Leading Research Institutions. ▪ Public Policy ▪ Commercial, Monetary Policies, and Tax Incentives -> Direct Subsidies, Tax Incentives for R&D, and Tax Incentives for Capital Investment, particularly for small companies by the local government. ▪ Positive Investment & Industrial Regime -> Favorable R&D Policy and Government Policies to Provide Incentives for R&D and Foreign/Domestic Investment. ▪ Supporting Economic Incentives -> Fiscal, Trade, Investment, R&D and Innovation Incentives ▪ Business & Political Climate ▪ Business Climate and Culture -> Climate of Business Innovation and Encouragement of Private Enterprise and Entrepreneurship ▪ Innovation and Entrepreneurship ▪ Existence of Entrepreneurial Base and Talent Commercialization of Ideas -> Existence of Incubators

A1.3.3 Heidelberg Technology Park, Germany

1		PROFILE INFORMATION
Common Name of Technology Park		Technologiepark-Heidelberg GR
Location		Heidelberg Germany, European Union
Phone		Tel. +49-6221-6506800
Email address		wolfgang.sprengel@rn-immobilien.de
Formal park Name		Technologiepark Heidelberg GmbH
Address Line 1		RN Immobilienmanagement GmbH Rhein Neckar Im Neuenheimer Feld 582 69120 Heidelberg
Address Line 2		Germany
Fax		+49-6221-6506829
Primary Focus		Life Science and Biotechnology
Principal Owner/Investor		The Sparkasse Heidelberg, holding formerly as much as 51% of the building compa-nies of the Technology Park Heidelberg, is now the only shareholder. In springtime it took over the shares of the German Real Estate AG, Hamburg.
Background		International Science Park with focus on Life Sciences Located close to the University of Heidelberg and to international research institutes [for example: Deutsches Krebsforschungszentrum (DKFZ), European Molecular Biology Laboratory (EMBL), Max-Planck-Institut, Zentrum für Molekulare Biologie Heidelberg (ZMBH)] Founded in 1985 Offer: about 50.000 sqm lab and office space Tenants (companies/institutions): 63 Employees (total): about 950
Vision		Centre of a network of information and communication Cooperation with the government, national and international institutions and and cooperation with the ministry and with the major scientific institutes in Heidelberg
Mission		Founded in 1985 the Technologiepark Heidelberg was the first Biopark in Germany, located in an excellent scientific environment. The mission of the Technologiepark Heidelberg is not only to be an incubator for start-ups. It is to support its tenants at any stage and any phase of growth. The Park offers and organizes all needed services for premature business ideas and projects, just started enterprises and growing companies, moving to their second, third or even further rounds of financing.

		The Park also welcomes "grown ups" and producing industrial partners. They all should be part of an adding value symbiosis in the life science industries. This includes access to support in many fields of biotech like patent law, tax and economic law, human resources, education, acquisition and mediation, management and financial concepts etc. as well as the organization of conferences, fairs and partnerings.
Location		**Technologiepark Heidelberg - Biopark** Im Neuenheimer Feld 515 - 519 & 580 - 584 D-69120 Heidelberg
Facilities		☐ 42.500 sqm lab and office space ☐ 3,7 ha ☐ conference room (photos) ☐ copy-room ☐ Bistro (Cafeteria) ☐ Campus Office of the Technologiepark Heidelberg GmbH *Address:* Technologiepark Heidelberg Im Neuenheimer Feld 515-519 & 580 -584 D-69120 Heidelberg 

1. Arrival by car

Motorway A 656 from Mannheim / A 5 from Karlsruhe or Frankfurt:

- From motorway A 5 (Karlsruhe): At motorway junction Heidelberg change to A 656
- At end of motorway, take **left lane** and follow signpost **Zoo / Chirurgie / Technologiepark**
- Take **right lane**
- Turn **right** immediately after passing **under bridge**
- **Cross** bridge of river Neckar

To buildings 515 - 518:

- Turn **left at third traffic light**, direction **Technologiepark**
- After 30 m turn **right** again (first junction)
- You will find the **Technologiepark** at the end of the street
- **Car parks** are in front and behind the buildings
- Campus Office of the Technology Park Heidelberg is located at building 515

2. Arrival by train (from Heidelberg Main Station):

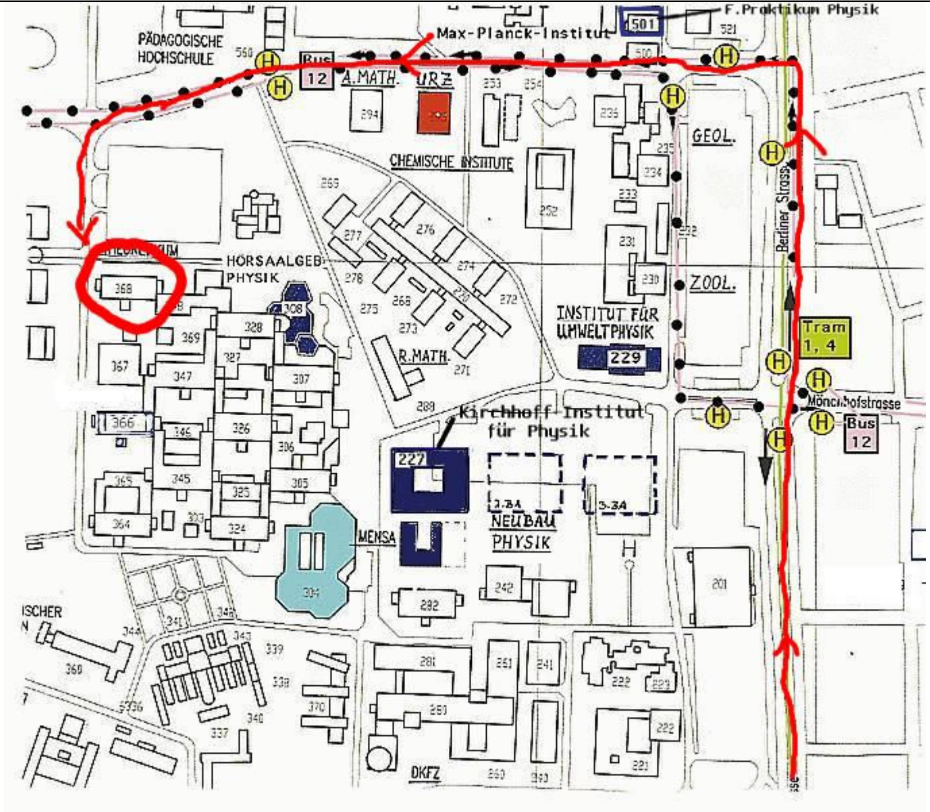
- Take **Tram No. 1** direction **Technologiepark** or **Tram No. 4** direction **Handschuhsheim**
- Get off at stop **Technologiepark**
- Cross Berliner Strasse on your **left-hand** side
- After 30 m turn **right**
- You will find the **Technologiepark** at the end of the street
- buildings 515 - 519 on the left side, buildings 580 - 584 on the right side

2. Arrival by plane (from Frankfurt airport):

- Take **busshuttle** from the airport to Heidelberg **Crowne-Palza-Hotel**
- by taxi you reach the **Technologiepark** around ten minutes

  or:
- Take **train** from **Frankfurt Airport** to Heidelberg
- Refer to the above mentioned directions

  or:
- Take motorway A 5, direction **Karlsruhe / Basel**
- Refer to the above mentioned directions

Services		**Services** Contact for Start-Up`s and SME`s with focus on Life Sciences Helping with: • renting office and lab space • financing • management/marketing • legal affairs Organizing seminars about current topics, like property law, financing etc. Participation in national and international congresses and meetings Publishing information-materials "Marketplace" for machines and lab-materials Conference-service Offering "Associated Membership" for non-tenants "TP-News", Newsletter of the Heidelberg Technology Park "TP-Forum", participants from science, business and politics "TP-Apero", informal meeting of tenants and associated members, monthly.
Price/Rent		**Price / Rent** Available at the time of application.
Map of Tech Park		

		Information: RN Immobilienmanagement GmbH Rhein Neckar Im Neuenheimer Feld 582 69120 Heidelberg Tel. +49-6221-6506800 Fax.+49-6221-6506829 Email: wolfgang.sprengel@rn-immobilien.de 
Principal Technologies in Tech park		Pharma and Biotech companies developing next generation drugs and biotech building blocks for drug discovery programs in the areas of obesity, inflammation, cardiovascular and cancer. The status of individual projects in the companies in the park range from the early discovery phase to completion of proof of principle in relevant animal models. Several projects are intended for out-licensing or can be pursued in joint partnership
Production, Revenues and Export Statistics		1000 employee in the park, 50.000 sqm lab and office space, 63 companies

Availability of Human Capital		Heidelberg University. Graduate programs in Life Sciences and Bio-Medical engineering Pharma/Biotech and life sciences. Close relationship between the Tech park and university. vi. **High-school educated labor force:** 100% vii. **Literate labor force:** 100% viii. **College-educated labor force:** 95% ix. **Scientists and engineers:** 65%
Availability of Finance and Investment Capital		VC investiment of $639Mil in th first 10 years
Resources and Incentives		Foreign Direct Investiment In Germany: ProjectsCapital Investment US$ 2005/11/9 $1.35 Bn 2004/24/7 $7.14 Bn 2003/26/9 $10.40 Bn Public Spending on Education is about 3.5% to 4% of the GDP
Regional Production System Linkages		The Technologiepark Heidelberg GmbH, the EMBL Enterprise Management Technology Transfer GmbH (EMBLEM), Heidelberg and the San Raffaele Biomedical Science Parc, Mailand signed a cooperation because of exchange and commercialisation of patents. EMBLEM currently manages a portfolio of more than one hundred and seventy patent families/copyrights and over two hundred license contracts. Our technology portfolio spans the Life Sciences in the broadest sense and includes enabling technologies, molecular tools and techniques, instruments, as well as software programmes and databases. San Raffaele is entirely dedicated to high quality research and technological development, as well as being open to housing industrial laboratories and affiliated institutions wishing to carry out their initiatives within an advanced technological environment. An outstanding achievement was the opening in 1996 of the University Vita-Salute San Raffaele, with degree

		course in Psychology, and Medicine and Surgery and a PhD Program in Cellular and Molecular Biology. More recently we established also a degree course in Medical and Pharmaceutical Technologies and the new Faculty of Philosophy. In this new academic institution, students can benefit from high quality lectures, research and clinical practice. Until a few years ago, the various components that now participate in the Science Park, that is academia (both medicine and biology), non-profit institutions (various private foundations) and industrial research enterprises, worked independently with collaboration established on an individual basis. The ongoing revolution of biomedical research requires that these boundaries be eliminated, and this is what we have accomplished with the San Raffaele Biomedical Science Park. The advantages obtained from this venture are extensive and significant, providing for all of us the stimuli needed to walk into the future with growing ethical and professional commitment.
Tenant Firms		• Alfatec-Pharma GmbH • Affimed Therapeutics AG • Alantos Pharmaceuticals AG • AlbuPharm Heidelberg GmbH & Co KG • Apogenix GmbH • Axaron Bioscience AG • Axios - Labor • Berufsfortbildungswerk EU-Projekte • BioCat GmbH • Biopharm GmbH • BioPheresis GmbH • BioRegion Rhein-Neckar-Dreieck e.V. • BioReliance Manufacturing GmbH • BioVendor GmbH • CellPrint GmbH • Complex BioSystems GmbH • Cytonet GmbH & Co. KG • Deutsches Krebsforschungszentrum, Abt. Toxikologie und Krebsrisikofaktoren • Deutsches Krebsforschungszentrum, several departments • Ernst & Young, Wirtschaftsprüfungsgesellschaft, Health Sciences/Biotech Team • Explo Heidelberg, Stiftung Jugend und Wissenschaft Heidelberg GmbH • febit biotech GmbH • FOCUS Clinical Drug Development GmbH • FTSS Germany GmbH • Gene Bridges, DNA Engineering Specialists • Gentana GmbH • GTB Ges. für Training und Beratung • Heart BioSystems GmbH • HeiCuMed, Heidelberg • Heidelberg Innovation GmbH

		● Heidelberg Innovation GmbH & Co. Bioscience Venture KG ● Heidelberger Life-Sience Lab ● HS Reisebüro GmbH, Heidelberg ● INTAVIS AG ● IP Merchandisers GmbH & Co KG ● Isenbruck - Bösl - Hörschler -Wichmann - Huhn, Patentanwälte ● Kinderkrankenpflegeschule des Universitätsklinikums Heidelberg ● KKS Koordinierungszentrum für Klinische Studien Heidelberg ● Meditcon GmbH ● MTM (molecular tools in medicine) Laboratories AG ● optiEinkauf ● Orpegen Pharma GmbH ● Peptide Specialty Laboratories GmbH ● PheneX Pharmaceutical AG ● Phytoplan GmbH ● PKB Marketing Support ● Polyzenix GmbH ● Recherche und Beratung, Henrik Schreiber Dipl. Chemiker ● RIFCON, Regulation Support, Infobroking, Faunistics & Consulting ● RTC - Rat und Tat im Chefsekretariat ● RZPD, Deutsches Ressourcenzentrum für Genomforschung ● Santhera Pharmaceuticals AG ● Steinbeis Transferzentrum für Reaktive Strömung ● synthon GmbH ● SymBiosis GmbH ● Technologiepark Heidelberg GmbH, Campus Office ● TeT Systems Holding GmbH & Co KG ● TF Instruments GmbH ● TherapySelect GmbH & Co. KG ● TICEBA GmbH ● WISAG Facility Management GmbH x. Wista Consulting GmbH
Tenant Firm Profiles		Biotech, Phrama research and development companies.
Assessment of Success or Failure		Level of success 4 out of 5 compare to the rest of the biotech parks in Germany.
KSFs or KFFs		Based on the secondary literature review relative to the Adlershof and Heidelberg Technology Parks, and the set of factors in the GLOINTECH model the key success factors appear to be: ▪ Factor Conditions -> Availability & Quality of Labor -> Availability of Skilled Labor. ▪ Firm Strategy and Rivalry -> Existence of Industry Leading Firms ->

		Proximity to Leading Research Institutions. ■ Public Policy ■ Commercial, Monetary Policies, and Tax Incentives -> Direct Subsidies, Tax Incentives for R&D, and Tax Incentives for Capital Investment, particularly for small companies by the local government. ■ Positive Investment & Industrial Regime -> Favorable R&D Policy and Government Policies to Provide Incentives for R&D and Foreign/Domestic Investment. ■ Supporting Economic Incentives -> Fiscal, Trade, Investment, R&D and Innovation Incentives ■ Business & Political Climate ■ Business Climate and Culture -> Climate of Business Innovation and Encouragement of Private Enterprise and Entrepreneurship ■ Innovation and Entrepreneurship ■ Existence of Entrepreneurial Base and Talent Commercialization of Ideas -> Existence of Incubators

A1.3.4 Cambridge Technology Park, England

1		PROFILE INFORMATION
Common Name of Technology Park		**Cambridge Technology Park**
Location		Cambridge, England
Phone		01223 841841
Email address		jtuck@bidwells.co.uk (Jeremy Tuck MRICS – Property Manager)
Formal park Name		The Cambridge Science Park
Address Line 1		24 Cambridge Science Park – The Trinity Centre
Address Line 2		Milton Road, Cambridge CB4 4FN
Fax		01223 559335
Primary Focus		Science and Technology
Principal Owner/Investor		Trinity College in Cambridge, United Kingdom
Background		**The Science Park Story** The land where the Cambridge Science Park is located, on the north-eastern edge of the City of Cambridge, has belonged to Trinity College since its foundation by King Henry VIII in 1546. It was farm land until World War II when it was requisitioned by the US Army and was used to prepare vehicles and tanks for the D-Day landings in Europe. After the war, the site lay largely derelict and increasingly threatened by planning blight until the decision to develop it was taken in 1970. The development was a response to a report by the Mott Committee, a special Cambridge University Committee set up under the Chairmanship of Sir Nevill Mott (then Cavendish Professor of Experimental Physics) to consider an appropriate response from Cambridge to an initiative of the Labour government following its election in 1964. Whitehall had urged UK universities to expand their contact with industry with the objective of technology transfer and also to increase the payback from investment in basic research and an expansion in higher education, in the form of new technologies. The Mott Committee, in its report published in 1969, recommended an expansion of 'science-based industry' close to Cambridge to take maximum advantage of the concentration of scientific expertise, equipment and libraries and to increase feedback from industry into the Cambridge scientific community. Trinity College was impressed with the importance of these ideas. The College had a long tradition of scientific research and innovation from

Sir Isaac Newton onwards and since it had a piece of land available, it decided to apply for planning permission to develop it as a science park, an idea born during the 50s in the USA where the first science park was established by Stanford University.

The first decade - 1970-80

Outline planning permission was granted in October 1971 and the first company, Laser-Scan, moved onto the site in Autumn 1973 following clearance and landscaping of the derelict area, conversion of the old gravel pit dug for wartime concrete standings into a lake and construction of the first stretch of road.

The growth of the Cambridge Science Park was slow in the first five years. The science park concept was an unfamiliar one and companies were mainly attracted to it by a desire to be close to the University's scientific research. Early on, UK subsidiaries of multinational companies started to locate there (LKB Biochrom from Sweden and US laser specialists Coherent were the first two of these) and the number of companies slowly grew to 25 by the end of the 70s.

The second decade - 1980-90

By the early 80s, a mini-cluster of technologies and people had developed and this, plus the attractions of Cambridge as a centre for research, began to draw in more companies. A period of strong growth followed and the Trinity Centre was opened in 1984 to provide a meeting place, meal facilities and conference rooms for the increasing number of people working at the park. More starter units and the Cambridge Innovation Centre were built to expand the range of accommodation available and a squash court was opened in 1986.

During the 80s, several venture capital companies opened offices on the park, including the regional office of 3i, the UK's leading venture capital company. In the second half of the decade, University academics began to bring companies to the park, encouraged by its success and also because of the breaking in the mid-80s of BTG's monopoly of intellectual property originating in UK universities.

The Cambridge Science Park also began to accommodate spin-outs from existing tenant companies such as Cambridge Consultants, and saw the first collaborative venture formed by park companies - Qudos, which was founded by the University's Microelectronics Laboratory (which was then located at the park), Prelude Technology Investments and Cambridge Consultants.

The third decade - 1990-1999

The 1990s saw many changes in the Cambridge hi-tech and science park scene. The cluster of hi-tech companies in the Cambridge area grew to some 1200 companies employing around 35,000 people and demand for space increased. Incubators for start-ups were established elsewhere in Cambridge and the supply of venture capital in the UK and from locally established venture funds had increased dramatically.

Fast growing internet and telecoms-related companies and the growth and success of a number of companies which had been at the Park for some years, altered the pattern of space occupation. However towards the end of the 1990s the life sciences sector started to grow and become the dominant technology sector on the Park.

There were now fewer but larger, better funded and more successful companies at the park and more of them were launched onto the UK Stock Exchange. A biotech venture capital fund, Merlin Ventures, opened an office on the Park. However, the origins of companies arriving were much the same as in the past: a mixture of spin-outs, developing new ventures from the Cambridge area and elsewhere in the UK, and UK subsidiaries of multinational companies. By December 1999, there were 64 companies at the Park employing some 4,000 people.

The twenty-first century

The new century has begun with many exciting developments on the Cambridge Science Park.

A joint venture between Trinity College and another Cambridge College - Trinity Hall (which owns the adjacent land) will complete the remaining 22.5 acres of brown field development land adjacent to the Park. Five bespoke buildings of between 29,000 sq ft of 36,000 sq ft have been designed, built and pre-let.

In September 2000, the Q.ton forum opened, accommodating a new conference centre, restaurant and bar. A new fitness centre also opened - the Q.ton Revolution. In 2001, a 115 place child care nursery was built providing a valuable resource for parents on the Park. Other benefits also brought onto the Park included 5 broadband services, a park-wide CCTV system and bus service.

Since 2002, the creation of new clusters has begun on the Cambridge Science Park, specifically in the areas of photonics, nanotechnology and materials science. In particular the strength of the photonics cluster is demonstrated by the arrival on the Park of Cambridge University's Centre of Molecular Materials for Photonics and Electronics (CMMPE). The centre was opened by Lord Sainsbury, the Minister for Science and Technology in February 2003.

Lord Sainsbury in his address at the launch of CMMPE said "Photonics will be to the next 20 years what electronics has been in the past 20".

The Centre represents another major milestone in the relationship between industry and academia and the prospect of further exciting development ahead for the Cambridge Science Park.

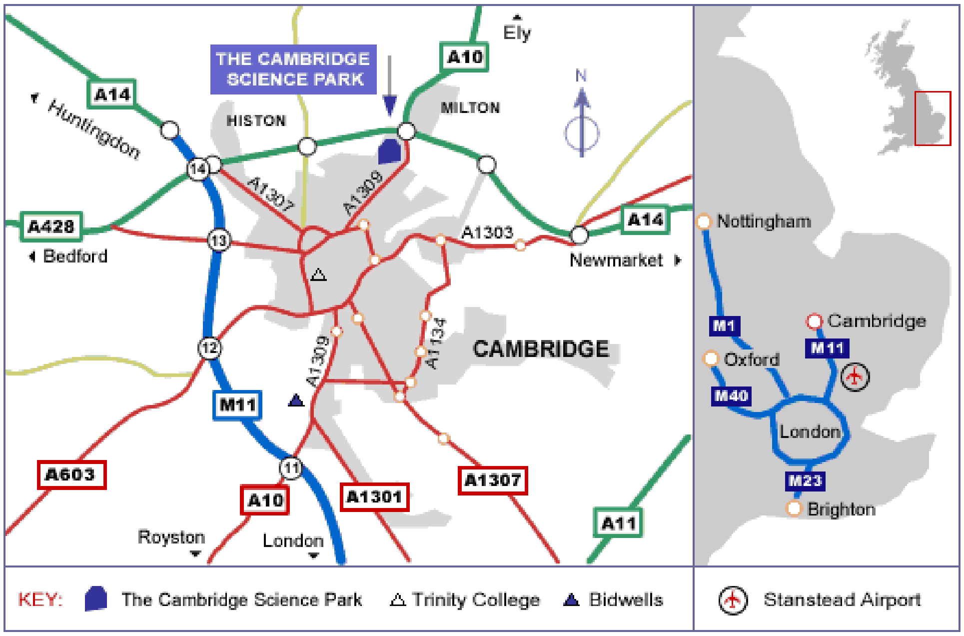
Facilities

Accommodation

Accommodation	**1,566,000sq ft**
Gross internal area	**1,566,000sq ft**

Office Accommodation

Trinity Centre	Conference Centre, Restaurant, Bar, Fitness Centre, Child Care Nursery
Site Area	152 Acres



Nearby Occupiers include

- 3i Plc
- Abcam
- Accelrys
- Advanced Technologies (Cambridge)
- Akubio Ltd
- Amgen
- Andrew Bryce & Co
- ART VPS
- Arthur D Little
- Astex Therapeutics Limited
- Auriplex
- Axxcelera Broadband Wireless UK Ltd
- Biochrom

- Biogemma UK
- Brady
- BritianiaBuild
- Broadcom
- Cachelogic
- Cambridge Business Travel
- Cambridge Consultants
- Cambridge Electronic Design
- Cambridge New Media
- Cambridge Online Systems
- Cambridge Photonics
- Cambridge Silicon Radio
- Centre of Molecular Materials for Photonics and Electronics
- Corbett Research Limited
- Cryptomathic
- Domantis
- Ember Europe Ltd
- Enecsys
- Epson (UK) Cambridge Laboratory
- ESRI (UK) Cambridge
- Foursys
- Frontier Developments
- Genapta Limited
- Geneservice Limited
- Genzyme Europe Research
- Hawkins & Associates
- Health Innovation Centre
- Heraeus Noblelight
- HLBBshaw
- Inion
- Innovative Manufacturing Research Centre (IMRC)
- Inpharmatica
- Inspirations Gym
- Johnson Matthey Catalysts
- Kidsunlimited Nurseries
- KMEO Ltd
- Kodak European Research
- Kudos Pharmaceuticals
- Lab 21
- Logotron
- Lorantis
- Mundipharma International
- Napp Pharmaceuticals
- NCE Discovery
- Neurascript
- Oakland Innovation and Information Services Ltd
- Organon Laboratories
- Oxygen Healthcare
- Paradigm Therapeutics
- Pharmorphix
- Phogen

- Plastic Logic
- Polatis
- Prometic Biosciences
- Purely Proteins Ltd
- Roundpoint
- Royal Society of Chemistry
- Saviso
- Shire Pharmaceuticals
- SimuGen
- Smart Holograms
- SSL International
- The International Education Consultancy Limited
- Toshiba Research Europe Cambridge Research Laboratory
- Trinity Centre
- Vectura Delivery Devices
- Wacom Components Europe Ltd
- WorldPay
- Xaar
- Xenova

Services

The Cambridge Science Park provides a wide range of accommodation for high technology companies and support services. There is a total of over 145,540 sq m (1,566,000sq ft) of accommodation divided into units of many sizes. At the smaller end there are office and laboratory buildings of 93 sq m (1,000 sq ft), while the largest buildings are in excess of 4,645 sq m (50,000 sq ft).

The Cambridge Science Park accommodates companies engaged in a wide range of research activities. Current occupiers include companies active in the life sciences, telecommunications, forensic accident investigation, photonics, terahertz technology and computer hardware and software development.

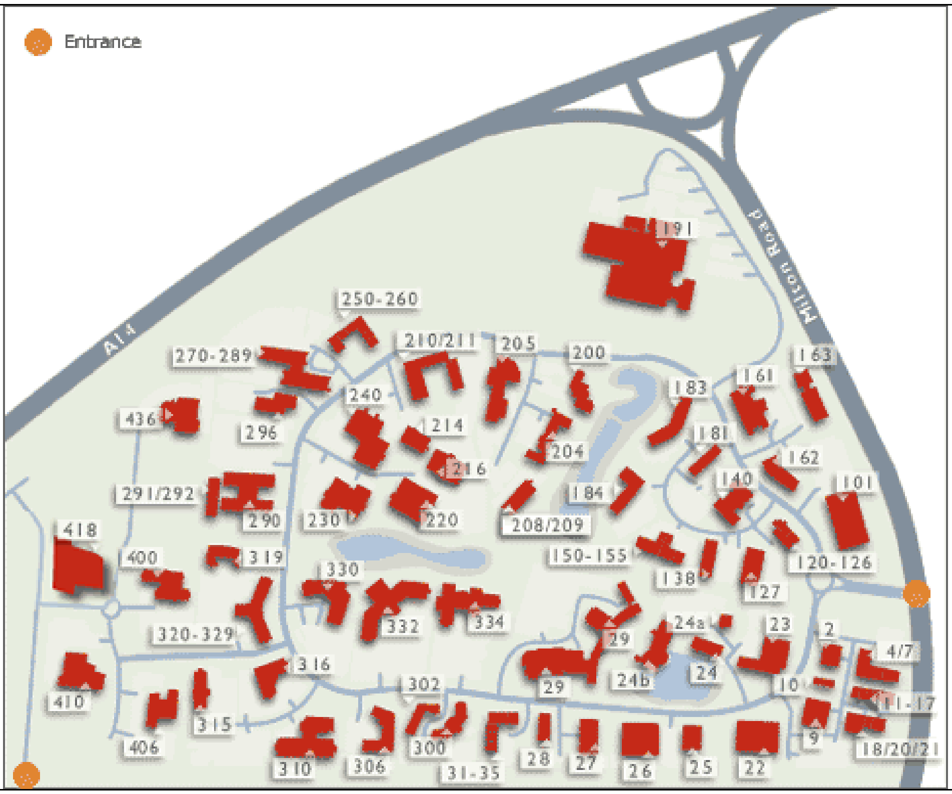
To accommodate the varied demands of these companies, the Cambridge Science Park provides a range of different buildings necessary to support the relevant research activities. These include:-

- clean rooms
- biology and chemistry laboratories
- optical table rooms
- high capacity server suites
- offices

Space at the Cambridge Science Park is available for lease on terms that reflect its particular specifications and the size of the premises. Typically, smaller units for 'start up' companies are available on shorter leases of between 1 month and 5 years.

The larger, more specialised buildings are available on leases of 15, 20 and 25 years. The exact terms will depend on a number of factors, including the specification.

Map of Tech Park



Principal Technologies in Tech park

Bio-Medical, Computer, Telecom, Technical Consulting, Energy, Environmental, Financial, Business, Industrial Technology, Materials

Tenant Firms

3i Plc

Provision of investment capital for developing businesses. Specialists in funding technology businesses and healthcare and leading management buy-outs.

121 Cambridge Science Park
Milton Road,
Cambridge CB4 0FZ

Tel: +44 (0)1223 420031
Fax: +44 (0)1223 420459
Web: www.3i.com

Abcam

Specialists in antibodies and associated reagents for the global life-science community. Core competences in speed to market and e-commerce.

332 Cambridge Science Park
Milton Road,
Cambridge CB4 0TP

Tel: +44 (0)1223 696000
Fax: +44 (0)1223 696001
Web: www.abcam.com

Accelrys

Develops and commercialises molecular modelling and simulation software for the life sciences and materials research markets.

334 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: +44 (0)1223 228500
Fax: +44 (0)1223 228501
Web: www.accelrys.com

Advanced Technologies (Cambridge)

Plant biotechnology company specialising in the research, development and commercialisation of technologies delivering processing and product improvements to the agricultural and forestry industries.

210 Cambridge Science Park
Milton Road,
Cambridge CB4 0WA

Tel: +44 (0)1223 420284
Fax: +44 (0)1223 423448
Web: www.atcbiotech.com

Akubio Ltd

Developers of a new approach to monitoring molecular interactions using acoustic technology. The technology enables rapid detection and determination of interaction affinities, both in buffered solutions and serum, urine and blood with potential applications in the diagnosis of clinical infections, screening of libraries for receptor binding, and the quantification of molecular interactions.

181 Cambridge Science Park
Milton Road,
Cambridge CB4 0GJ

Tel: +44 (0)1223 225335
Fax: +44 (0)1223 225336
Web: www.akubio.com

Amgen

Amgen develops and markets cost effective therapeutics based on advances in cellular and molecular biology, and is the worlds largest independent biotechnology company. Cambridge is the headquarters for European Clinical Development and UK/Ireland commercial operation.

240 Cambridge Science Park
Milton Road,
Cambridge CB4 0WD

Tel: +44 (0)1223 420305
Fax: +44 (0)1223 426078
Web: www.amgen.com

Andrew Bryce & Co

Andrew Bryce is an environmental and health and safety lawyer running a sole practice who deals with a range of regulatory work for the waste and industrial sectors, in particular criminal defence.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437011
Fax:
Web:

ART VPS

ART VPS develops and markets virtual photography 3D CAD solutions for the architectural, industrial design, and computer graphics markets. Virtual Photography allows computers to create images of uncompromising realism from the 3D digital data.

11 Cambridge Science Park
Milton Road,
Cambridge CB4 0FQ

Tel: +44 (0)1223 424466
Fax: +44 (0)1223 424467
Web: www.artvps.com

Arthur D Little

Technical and management consultants specialising in environmental and health safety consulting services for companies, institutions and governments in Europe, the Middle East and Africa. Subsidiary of Arthur D Little Inc.

300 Cambridge Science Park
Milton Road,
Cambridge CB4 0DW

Tel: +44 (0)1223 392090
Fax: +44 (0)1223 420021
Web: www.arthurdlittle.com

Astex Therapeutics Limited

Astex is a structure-based drug discovery company pioneering the use of high throughput X-ray crystallography technology for the rapid identification of novel drug candidates. HTX ® technology is part of an innovative drug discovery platform that integrates all aspects of structure-based research.

436 Cambridge Science Park
Milton Road,
Cambridge CB4 0QA

Tel: +44 (0)1223 226200
Fax: +44 (0)1223 226201
Web: www.astex-therapeutics.com

Auriplex

Auriplex is a technology company which designs, produces and markets wireless communication systems.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437009
Fax:
Web: www.auriplex.com

Axxcelera Broadband Wireless UK Ltd

Axxcelera Broadband is a wireless networking solutions company that is developing leading edge technologies for deployment of broadband communications over the Internet. Axxcelera solutions offer point-to-multipoint and point-to-point fixed wireless applications supporting the UNII band, 5.8GHz ISM and 3.5GHz. As well as future products based on WiMAX technology providing overall cost effective solutions for residential and industrial markets.

296 Cambridge Science Park
Milton Road,
Cambridge CB4 0WD

Tel: 44 + (0) 1223 438250
Fax: 44 + (0) 1223 438251
Web: www.axxcelera.com

Biochrom

Design, development, production, marketing and sales of analytical instruments and chemicals, including automatic amino acid analysers and spectrophotometers.

22 Cambridge Science Park
Milton Road,
Cambridge CB4 0FJ

Tel: +44 (0)1223 423723
Fax: +44 (0)1223 420164
Web: www.biochrom.co.uk

Biogemma UK

Cell and molecular technology applied to genetic improvement of a wide range of European crops, particularly cereals and oil seed rape.

200 Cambridge Science Park
Milton Road,
Cambridge CB4 0GZ

Tel: +44 (0)1223 723333
Fax: +44 (0)1223 723330
Web: www.biogemma.com

Brady

Software solutions for banking companies, dealing in financial markets. Leading provider of derivative trading and risk management software to the banking industry.

281 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: +44 (0)1223 479479
Fax: +44 (0)1223 472510
Web: www.bradytrinity.com

BritianiaBuild

Britaniabuild is an experienced building and renovation company which has worked on major projects for the University of Cambridge as well as for a variety of Cambridge Science Park tenants.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel:
Fax:
Web: www.britaniabuild.com

Broadcom

Broadcom is a global leader in wired and wireless broadband communications semiconductors. Products enable the convergence of high-speed data, high definition video, voice and audio at home, in the office and on the go. Broadcom provides manufacturers of computing and networking equipment, digital entertainment and broadband access products, and mobile devices with the industry's broadest portfolio of state-of-the-art system-on-a-chip and software solutions.

406 Cambridge Science Park
Milton Road,
Cambridge CB4 0WW

Tel: +44 (0)1223 420003
Fax: +44 (0)1223 420013
Web: www.broadcom.com

Cachelogic

CacheLogic is a technology development company that provides a suite of complementary products that deliver traffic management and network intelligence solutions primarily to the Internet Service Provider (ISP) and telecommunications sectors. CacheLogic’s core product suite provides a carrier grade solution that enables ISPs to make significant cost savings through the intelligent management of peer-to-peer traffic across their networks.

326 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: 01223 395915
Fax:
Web:

Cambridge Business Travel

Business travel agent/conferences.

325 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1223 566445
Fax: +44 (0)1223 566490
Web: www.cambridgebusinesstravel.co.uk

Cambridge Consultants

As one of Europe\'s innovation companies, CCL solves problems through the application of technology. We design and develop innovative products, processes and systems, using multi-skilled teams.

29 Cambridge Science Park
Milton Road,
Cambridge CB4 0DW

Tel: +44 (0)1223 420024
Fax: +44 (0)1223 423373
Web: www.cambridgeconsultants.com

Cambridge Electronic Design

Design and manufacture of computer hardware and software used for acquisition and analysis of complex waveform and event data.

4 Cambridge Science Park
Milton Road,
Cambridge CB4 0FE

Tel: +44 (0)1223 420186
Fax: +44 (0)1223 420488
Web: www.ced.co.uk

Cambridge New Media

Cambridge New Media Ltd is a full service digital agency, specialising in web-based application development and the creation of standards-based accessible, elegant and user-friendly web sites.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 08701 997 128
Fax:
Web: www.cambridgenewmedia.co.uk

Cambridge Online Systems

Software and systems integrator for business applications, applied technology and aircraft maintenance.

163 Cambridge Science Park
Milton Road,
Cambridge CB4 0GP

Tel: +44 (0)1223 422600
Fax: +44 (0)1223 422601
Web: www.cambridgeonline.net

Cambridge Photonics

Cambridge Photonics was founded in 2001 to develop and market Reconfigurable Add Drop Multiplexers for the Telecommunications Industry. CPL's products will offer substantial increases in performance and reliability at the same time as large reductions in operating costs. Working in collaboration with the Cambridge University's Engineering Department, CPL's technology is based on Liquid Crystal on Silicon Spatial Light Modulators.

26 Cambridge Science Park
Milton Road,
Cambridge CB4 0FP

Tel:
Fax: +44 (0)1223 423153
Web:

Cambridge Silicon Radio

Design and development of single chip radio devices serving the global market for short range radio communications.

400 Cambridge Science Park
Milton Road,
Cambridge CB4 0WH

Tel: +44 (0)1223 692000
Fax: +44 (0)1223 692001
Web: www.csr.com

Centre of Molecular Materials for Photonics and Electronics

Liquid Crystal Physics; Linear and Nonlinear Optics; Photonic Devices and Displays; Ferroelectrics and Antiferroelectrics; Flexoelectricity; Photochromics; Diffractive and Holographic Elements; Waveguide couplers; Quasi and Adaptive Optics; Raman and Correlation Spectroscopy; X-Ray Scattering; Electro-optics and Dielectric Studies; New Materials.

26 Cambridge Science Park
Milton Road,
Cambridge CB4 0FP

Tel: 01223 741873
Fax: 01223 741869
Web:

Corbett Research Limited

Corbett Research is an Australian based Biotechnology Company with over 12 years experience in developing specialised equipment for the Biotechnology and Life Sciences market. Corbett Research's innovative range of Genetic Analysis equipment is recognized locally and internationally as setting new standards in precision and performance.

296 Cambridge Science Park
Milton Road,
Cambridge CB4 0WD

Tel: + 44 1223 424288
Fax: + 44 1223 424144
Web: www.corbettresearch.com

Cryptomathic

A world leading provider of e-Security software products, complete security solutions and hardware enhancements - as well as advanced consulting and education - for telecommunication companies, banks/banking organisations, software vendors, system integrators and others.

329 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1223 225350
Fax: +44 (0)1223 225351
Web: www.cryptomathic.com

Domantis

Domantis is a biotechnology company engaged in the discovery and development of a new generation of proprietary protein products that incorporate the biological benefits and commercial advantages of both large proteins and small molecules.

315 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: 01223 226900
Fax: 01223 226901
Web: www.domantis.com

Ember Europe Ltd

Ember provides mesh wireless networking solutions based on IEEE802.15.4 (ZigBee) technology.

29 Cambridge Science Park
Milton Road,
Cambridge CB4 0DW

Tel: + 44 (0) 1223 423322
Fax: + 44 (0) 1223 423390
Web: www.ember.com

Enecsys

Enecsys has developed proprietary power electronic control and integrated circuit technology to allow for the next generation of power conditioning units for grid-connected renewable energy applications, initially focused on solar energy solutions.

332 Cambridge Science Park
Milton Road,
Cambridge CB4 0BZ

Tel:
Fax:
Web: www.enecsys.com

Epson (UK) Cambridge Laboratory

Research into devices using novel materials and associated electronic circuitry are planned as main research subjects at Epson Cambridge Laboratory. Two main areas of research underway are thin film transistors and light-emitting polymers.

9 Cambridge Science Park
Milton Road,
Cambridge CB4 0FE

Tel: +44 (0)1223 438177
Fax: +44 (0)1223 438178
Web: www.epson.co.uk

ESRI (UK) Cambridge

Supplier providing mission critical geo-spatial solutions and applications that promote efficiency and productivity for our customers in utilities and local government.

302 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1296 745500
Fax: +44 (0)1296 745544
Web: www.esriuk.com

Foursys

Sales and support services for PC networks including Windows NT/2000, Exchange, AntiVirus and Content Security software.

14 Cambridge Science Park
Milton Road,
Cambridge CB4 0FQ

Tel: +44 (0)1223 423311
Fax: +44 (0)1223 423855
Web: www.foursys.co.uk

Frontier Developments

Frontier is one of the world's leading game developers, having built upon the innovative creations of founder David Braben. Frontier's games, including RollerCoaster Tycoon 3 and Wallace & Gromit: Curse of the Were-rabbit, have received critical acclaim as well as commercial success. Frontier is currently recruiting for its next-generation games console and handheld projects.

306 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: 01223 394303
Fax:
Web:

Genapta Limited

Genapta Ltd is a spin-out from the Department of Physics at the University of Cambridge and supplies high-performance optical platforms for pharmaceutical screening, DNA sequencing and genomic testing.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 426666
Fax:
Web: www.genapta.com

Geneservice Limited

Supplier of genomic clone and library products and technology services, including: DNA Extraction, Banking, Sequencing and Whole Genome Amplification; Gene Mapping; and mRNA Expression Analysis.

2 Cambridge Science Park
Milton Road,
Cambridge CB4 0FE

Tel: (01223) 432600
Fax: (01223) 432601
Web: www.geneservice.co.uk/home/

Genzyme Europe Research

Genzyme Corporation is a global biotechnology company dedicated to making a major positive impact on the lives of people with serious diseases. The company\'s broad product portfolio is focused on rare genetic disorders, renal disease, osteoarthritis and immune-mediated diseases, and includes an industry-leading array of diagnostic products and services.

310 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: + 44 (0) 1223 394000
Fax: + 44 (0) 1223 394190
Web: www.genzyme.co.uk

Hawkins & Associates

Consulting scientists and support staff engineers specialising in investigating the causes of fires and explosions, rail, road and aircraft accidents, plant and product failures, industrial accidents and occupational health and safety matters, mainly on behalf of insurance companies and loss adjusters.

25 Cambridge Science Park
Milton Road,
Cambridge CB4 0FE

Tel: +44 (0)1223 420400
Fax: +44 (0)1223 420181
Web: www.rbhawkins.com

Health Innovation Centre

The Health Innovation Centre provides training, testing and development for the NHS National Programme for IT in the East of England as part of a major restructure and integration of NHS information systems country-wide.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel:
Fax:
Web:

Heraeus Noblelight

Design and manufacture of noble gas-filled flashlamps for science and industry, particularly lasers.

161 Cambridge Science Park
Milton Road,
Cambridge CB4 0GQ

Tel: +44 (0)1223 423324
Fax: +44 (0)1223 423999
Web: www.heraeus-noblelight.co.uk

HLBBshaw

HLBBshaw is an international firm of patent attorneys specialising in life sciences, biotech, IT, and electronics.

303 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1223 225300
Fax: +44 (0)1223 423701
Web: www.hlbbshaw.com

Inion

Inion specialises in the development of biodegradable medical implants, a fast-growing segment of the global orthopaedics market. This growth is being driven by an on-going shift from metal implants to biodegradable materials based on a range of benefits they provide to both the patient and the surgeon.

9 Cambridge Science Park
Milton Road,
Cambridge CB4 0FG

Tel: 01223 394200
Fax: 01223 934210
Web: www.inion.com

Innovative Manufacturing Research Centre (IMRC)

The objective of the Innovative Manufacturing Research Centre (IMRC) is to create, deliver, disseminate and exploit a coherent and unified programme of novel and innovative research in manufacturing. The expertise of this IMRC is in developing next generation manufacturing technologies that are high speed and capable of flexible production using reconfigurable processes and time compression principles.

26 Cambridge Science Park
Milton Road,
Cambridge CB4 0FP

Tel: + 44 (0) 1223 741846
Fax: + 44 (0) 1223 741852
Web: www-mmd.eng.cam.ac.uk/

Inpharmatica

Inpharmatica is a drug discovery company focused on the design of optimal chemical entities using a multi-disciplinary approach that integrates intelligent molecule design and high-throughput, automated chemistry, in parallel with predictive modeling of ADMET parameters.

127 Cambridge Science Park
Milton Road,
Cambridge CB4 0GD

Tel: +44 (0)1223 424825
Fax: +44 (0)1223 425416
Web: www.inpharmatica.co.uk

Inspirations Gym

Including gym, jacuzzi, sauna and squash club.

24 Cambridge Science Park
Milton Road,
Cambridge CB4 0FN

Tel: +44 (0)1223 395899
Fax: +44 (0)1223 395898
Web: www.thetrinitycentre.com/gym.asp

Johnson Matthey Catalysts

Johnson Matthey Catalysts is a technology provider to the pharmaceuticals market that aims to deliver a full range of asymmetric catalytic processes for fine chemical and pharmaceutical companies.

28 Cambridge Science Park
Milton Road,
Cambridge CB4 0FP

Tel: +44 (0)1223 226160
Fax: +44 (0)1223 438037
Web: www.jmcatalysts.com/pct/

Kidsunlimited Nurseries

The nursery offers 115 full- and part-time places for children aged 3 months to 5 years.

319 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1223 424418
Fax: not available
Web: www.kidsunlimited.co.uk

KMEO Ltd

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437043
Fax:
Web:

Kodak European Research

Kodak's new Cambridge Research Centre will focus on key technologies in the area of display, commercial printing and health imaging, with the first phase group located in the Innovation Centre and the Research Centre due to become fully functional in 2006.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437025
Fax:
Web: www.kodak.com

Kudos Pharmaceuticals

Specialist pharmaceutical company whose aim is the discovery and development of products which will significantly improve disease management of life-threatening conditions.

327 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0)1223 719719
Fax: +44 (0)1223 719720
Web: www.kudospharma.co.uk

Lab 21

Provides technically advanced clinical testing services that support the pharmaceutical industry and healthcare providers as we move towards personalised medicine. The Company also provides instrumentation and services for monitoring pollutants and toxins in the environment. Lab21 offers a unique portfolio of cutting-edge molecular diagnostics, viral characterisation, pharmacogenetic tests, and patient profiling services

184 Cambridge Science Park
Milton Road,
Cambridge CB4 0GA

Tel: 01223 395460
Fax:
Web: www.lab-21.com

Logotron

Innovative software publisher for high performance 32 bit personal computers in the schools and home learning markets.

124 Cambridge Science Park
Milton Road,
Cambridge CB4 0ZS

Tel: +44 (0)1223 425558
Fax: +44 (0)1223 425349
Web: www.logo.com

Lorantis

Discovery of new drugs to regulate immune responses.

410 Cambridge Science Park
Milton Road,
Cambridge CB4 0PE

Tel: +44 (0)1223 702500
Fax: +44 (0)1223 702599
Web: www.lorantis.com

Mundipharma International

Undertakes licensing of human pharmaceutical products for Mundipharma Group of companies, including the Napp Group.

220 Cambridge Science Park
Milton Road,
Cambridge CB4 0GW

Tel: +44 (0)1223 424211
Fax: +44 (0)1223 426626
Web: www.mundipharma.co.uk

Napp Pharmaceuticals

Research, development, manufacture, marketing, sales and distribution of ethical pharmaceuticals.

191 Cambridge Science Park
Milton Road,
Cambridge CB4 0GW

Tel: +44 (0)1223 424444
Fax: +44 (0)1223 424441
Web: www.napp.co.uk

NCE Discovery

The focus of the Company is to carry out the necessary medicinal chemistry on behalf of clients in order to provide them with candidate drugs to enter their development pipeline.

418 Cambridge Science Park
Milton Road,
Cambridge CB4 0PA

Tel: +44(0)1284 747214
Fax: +44(0)1284 747288
Web: www.ncediscovery.com

Neurascript

Neurascript provide Information Capture solutions that streamline the conversion of documents into useful electronic data. These solutions deliver significant business benefits: faster information processing, lower operational costs and guaranteed data integrity. Neurascript is part of DICOM Group PLC (London Stock Exchange, DCM), the global leader in the Information Capture market.

201 Cambridge Science Park
Milton Road,
Cambridge CB4 0GZ

Tel: +44 (0) 870 460 6120
Fax: +44 (0) 870 460 6121
Web: www.neurascript.com

Oakland Innovation and Information Services Ltd

A specialist information company with particular experience in the provision of intelligence to support innovation and technical development in the business community.

18 Cambridge Science Park
Milton Road,
Cambridge CB4 0FH

Tel: +44 (0)1223 507500
Fax: +44 (0)1223 507501
Web: www.oakland.co.uk

Organon Laboratories

Research, manufacture and marketing of human ethical pharmaceuticals.

330 Cambridge Science Park
Milton Road,
Cambridge CB4 0FL

Tel: +44 (0)1223 432700
Fax: +44 (0)1223 424368
Web: www.organon.com

Oxygen Healthcare

Oxygen Healthcare is a provider of contract chemistry services to biotechnology and pharmaceutical companies from its offices in Cambridge, UK and research facilities in Ahmedabad, India. It offers international-class project management and communication from the UK at a price that is reflective of the lower research costs in India.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437013
Fax:
Web: www.oxygenhealthcare.com

Paradigm Therapeutics

Use of in vivo functional genomics to predict clinical utility of novel drug targets from the human genome.

162 Cambridge Science Park
Milton Road,
Cambridge CB4 0GP

Tel: 01223 477910
Fax: 01223 477911
Web:

Pharmorphix

Pharmorphix are involved in early stage polymorph identification, using crystallographic drug discovery chemistry.

250 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: 01223 425105
Fax:
Web: www.pharmorphix.com

Phogen

Joint venture company established by Cantab Pharmaceuticals and Marie Curie Cancer Care to develop a new drug discovery concept based VP22 protein technology.

155 Cambridge Science Park
Milton Road,
Cambridge CB4 0GN

Tel: +44 (0)1223 424488
Fax: +44 (0)1223 426115
Web: www.phogen.com

Plastic Logic

A spin-out from the Cavendish Laboratory, Plastic Logic was formed to exploit exciting new technology for printing polymer microelectronics.

34 Cambridge Science Park
Milton Road,
Cambridge CB4 0FX

Tel: +44 (0)1223 706000
Fax: +44 (0)1223 706006
Web: www.plasticlogic.com

Polatis

Polatis are developing new optical switch technology for the global fibre-optic communications network. They were founded in June 2000 by Andrew Dames.

332 Cambridge Science Park
Milton Road,
Cambridge CB4 OBZ

Tel: +44 (0)1223 424200
Fax: +44 (0)1223 472015
Web: www.polatis.com

Prometic Biosciences

Develop, manufacture and sell innovative products and technology for the biomedical industry and for the purification, stabilisation and delivery of biopharmaceuticals.

211 Cambridge Science Park
Milton Road,
Cambridge CB4 0ZA

Tel: +44 (0)1223 420300
Fax: +44 (0)1223 420270
Web: www.prometic.com

Purely Proteins Ltd

Purely Proteins expresses, purifies and supplies human proteins at any scale to accelerate drug discovery research. We provide a broad range of related protein-based solutions including informatics, therapeutically relevant purified proteins and client driven purification, chemical screening and drug profiling programmes.

254 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: 01223 426400
Fax: 01223 426003
Web: www.purelyproteins.com

Roundpoint

Service providers in websites wishing to publish content to PDA\'s and moble devices. Publish newspaper content to the web.

29 Cambridge Science Park
Milton Road,
Cambridge CB4 0DW

Tel: 01223 392414
Fax: 01223 392420
Web:

Royal Society of Chemistry

Information storage, retrieval and dissemination in the field of chemistry and allied scientific disciplines using modern technology, publishing of learned journals and provision of online services.

290 Cambridge Science Park
Milton Road,

Cambridge CB4 0WF

Tel: +44 (0)1223 420066
Fax: +44 (0)1223 423623
Web: www.rsc.org

Saviso

Saviso, a subsidiary of CacheLogic, is a technology consulting, application development and solution design team focused on the needs of the Internet infrastructure market. Our team is comprised of technology and strategy experts that have been actively involved in the growth of large scale Internet infrastructure since 1995.

326 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: 01223 395900
Fax:
Web: www.saviso.com

Shire Pharmaceuticals

Shire is a biopharmaceutical company focused on developing products for the treatment of rare diseases, with a major emphasis in the area of lysosomal storage disorders.

296 Cambridge Science Park
Milton Road,
Cambridge CB4 0WD

Tel: + 44 (0) 1223 422700

Fax: + 44 (0) 1223 422701
Web: http://www.shire.com/shire

SimuGen

SimuGen's business is producing patented and proprietary gene profiling kits that predict substance toxicity cheaper, better and faster than standard methods, such as animal testing.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel:
Fax:
Web: www.simugen.co.uk

Smart Holograms

Smart was founded in 2002 by Professor Chris Lowe of Cambridge University to exploit an exciting new technology that enables the development of a new generation of sensors for use in the Life Sciences Industry. The technology comprises novel interactive holograms ("sensor holograms") that can be engineered to change colour, image, brightness or position in response to a wide range of biological, chemical and physical stimuli.

291 Cambridge Science Park
Milton Road,
Cambridge CB4 0WF

Tel: +44 (0)1223 393 400
Fax: +44 (0)1223 393 401
Web: www.smartholograms.com

SSL International

Development of thin barrier products including surgical gloves and contraceptives from latex and synthetic polymers. SSL International also markets OTC medicines, footwear, footcare and wound management products.

205 Cambridge Science Park
Milton Road,
Cambridge CB4 0GZ

Tel: +44 (0)1223 423232
Fax: +44 (0)1223 423310
Web: www.ssl-international.com

The International Education Consultancy Limited

The International Education Consultancy (TIEC) is a multi-disciplinary consulting company specialising in international education strategy and international student recruitment services. TIEC currently works with several leading institutions across the globe. The company's key activities are in Africa and the UK.

23 Cambridge Science Park
Milton Road,
Cambridge CB4 0EY

Tel: 01223 437003
Fax:
Web: www.tiec.co.uk

Toshiba Research Europe Cambridge Research Laboratory

Theoretical and experimental research into quantum physics, particularly with reference to the electronic and optical properties of advanced structures of semiconductor materials, the growth of which is controlled at the atomic level.

260 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: +44 (0)1223 436900
Fax: +44 (0)1223 436909
Web: www.toshiba-europe.com/research/

Trinity Centre

The Trinity Centre is the central facilities building at the Cambridge Science Park, providing seminar and conference rooms in addition to restaurant and bar.

24 Cambridge Science Park
Milton Road,
Cambridge CB4 4FN

Tel: +44 (0)1223 395800
Fax: +44 (0)1223 395827
Web: www.thetrinitycentre.com

Vectura Delivery Devices

Vectura is a revenue generating, speciality pharmaceuticals company, with expertise in particle science, device engineering and product development. It produces innovative formulation and device systems for pulmonary, oral, and dermal drug delivery.

21 Cambridge Science Park
Milton Road,
Cambridge CB4 0TP

Tel: +44 (0)1223 422900
Fax: +44 (0)1223 422901
Web: www.vectura.com

Wacom Components Europe Ltd

WACOM Components is the leading developer of inductive position sensing technology for mobile appliances.

322 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

Tel: +44 (0) 1223 438230
Fax:
Web: www.wacom-components.com

WorldPay

WorldPay is a global provider of secure, multi-currency Internet card payment systems and eCommerce solutions.

270 Cambridge Science Park
Milton Road,
Cambridge CB4 0WE

Tel: +44 (0)870 742 7000
Fax: +44 (0)870 742 7009
Web: www.worldpay.com

Xaar

Development and exploitation of high resolution, low-cost printing technology based on ink jet.

316 Cambridge Science Park
Milton Road,
Cambridge CB4 0XR

Tel: +44 (0)1223 423663
Fax: +44 (0)1223 423590
Web: www.xaar.co.uk

Xenova

Biopharmaceutical company developing novel therapeutic vaccines and gene delivery products.

310 Cambridge Science Park
Milton Road,
Cambridge CB4 0WG

<table>
<tr><td></td><td></td><td>Tel: +44 (0)1223 423413
Fax: +44 (0)1223 423458
Web: www.xenova.com</td></tr>
<tr><td>Assessment of Success or Failure</td><td></td><td>Despite a wide variety of tenants (71 firms) housing over 5,000 employees the conclusion of this science park is that it is **UNSUCCESSFUL**. Although Cambridge Science park has a rich history and is located in a well known as a high tech cluster, it has not seen the growth that parks and clusters in other regions such as Silicon Valley and Research Triangle Park.

There is lack of government support and anchor firms. This makes it very tough to attract new tenants and to keep existing tenants in business.</td></tr>
<tr><td>KSFs or KFFs</td><td></td><td>Key Success Factors:

1. Factor Conditions

• Modern communication infrastructure –

The Cambridge Science Park has the benefit of 5 fibre optic broadband systems in operation. These are operated by:

<table>
<tr><td>BT</td><td>www.bt.com/elocations</td><td>01977 592194</td></tr>
<tr><td>MCI Worldcom</td><td>www.wcom.com/uk</td><td>0800 018 1818</td></tr>
<tr><td>Redstone Communications</td><td>www.redstone.co.uk</td><td>01223 713689</td></tr>
<tr><td>Ntl</td><td>www.ntl.com</td><td>01223 567275</td></tr>
<tr><td>Cable & Wireless</td><td>www.cw.com</td><td>0800 0892 0636</td></tr>
</table>

Each supplier has installed their own infrastructure and an extensive duct system provides ready access to most buildings. [1]

b. Availability of Labor – Presence of Skilled Labor due to proximity to a major universities.

• Existence of Higher Education institutions – There are currently a major university near Cambridge Science Park. It is the Trinity College [2]</td></tr>
</table>

2. Path Dependency

a. Previous History of Development

- Historical Growth of Firms and Business - Established by Trinity College in 1970, Cambridge Science Park is the UK's oldest and most prestigious science park.

  Now home to 71 hi-tech companies and 5,000 personnel, Cambridge Science Park continues to attract new businesses, from small start-ups and spin-outs to subsidiaries of multinational corporations. [1] Cambridge Science Park has a rich history and success which coined the phrase "Cambridge Phenomenon".

3. Element of Chance

a. Reputation as Leading Location – Cambridge is known as the European Silicon Valley.

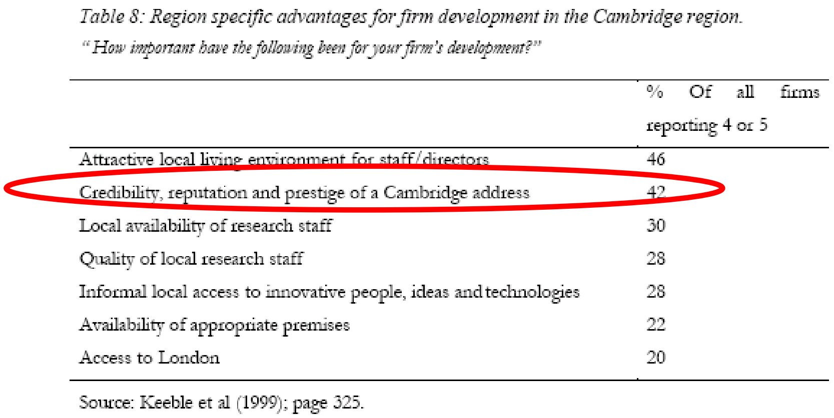


Table 8: Region specific advantages for firm development in the Cambridge region.
"How important have the following been for your firm's development?"

	% Of all firms reporting 4 or 5
Attractive local living environment for staff/directors	46
Credibility, reputation and prestige of a Cambridge address	42
Local availability of research staff	30
Quality of local research staff	28
Informal local access to innovative people, ideas and technologies	28
Availability of appropriate premises	22
Access to London	20

Source: Keeble et al (1999); page 325.

Because Cambridge had a early and sudden success in its history, it is considered to be a prestigious location for high technology.

<u>Key Failure Factors:</u>

Lack of Anchor effect

Lack of Industry Leaders – "The region does not boast a large number of outstandingly successful firms that grew to large size." [3]

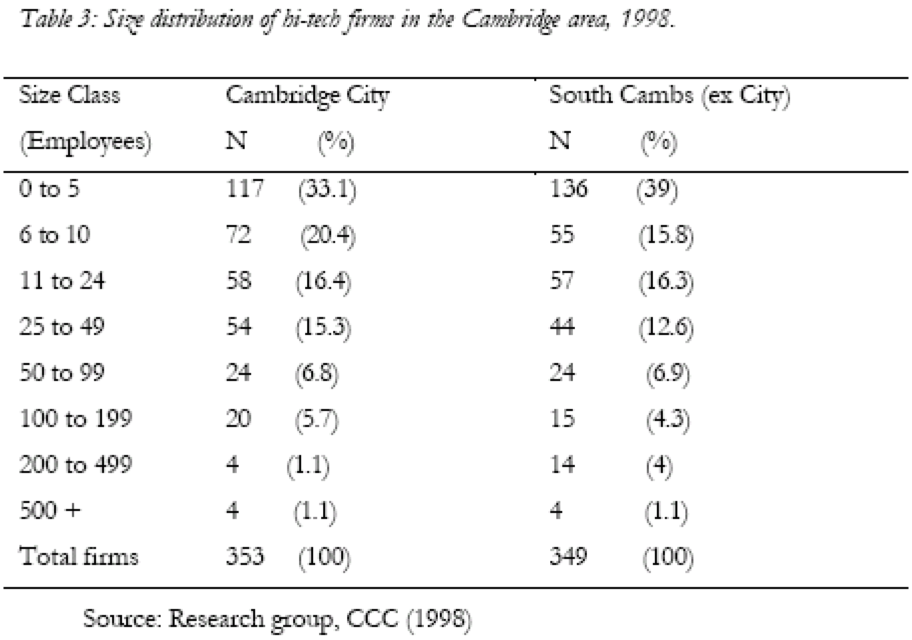


Table 3: Size distribution of hi-tech firms in the Cambridge area, 1998.

Size Class	Cambridge City		South Cambs (ex City)	
(Employees)	N	(%)	N	(%)
0 to 5	117	(33.1)	136	(39)
6 to 10	72	(20.4)	55	(15.8)
11 to 24	58	(16.4)	57	(16.3)
25 to 49	54	(15.3)	44	(12.6)
50 to 99	24	(6.8)	24	(6.9)
100 to 199	20	(5.7)	15	(4.3)
200 to 499	4	(1.1)	14	(4)
500 +	4	(1.1)	4	(1.1)
Total firms	353	(100)	349	(100)

Source: Research group, CCC (1998)

Lack of Public Policies

> " With no government policies to help, Cambridge tried to manufature technology products based initially on commercializing science from the university laboratories. It tried to produce technology products that were general rather than specific…." [3]

Notes:

1 http://www.cambridge-science-park.co.uk/home.htm - Cambridge Science Park website

2 http://www.trin.cam.ac.uk/ - Trinity College, University of Cambridge in Cambridge, UK

3 http://econwpa.wustl.edu/eps/urb/papers/0308/0308001.pdf - Agglomeration and Growth: The study of the Cambridge Hi-Tech Cluster, by Suma S. Athreye.

A1.3.5 Sheffield Technology Park, England

1		PROFILE INFORMATION
Common Name of Technology Park		**Sheffield Technology Park**
Location		Sheffield, England
Phone		0114 - 22 11 800
Email address		enquiries@shefftechparks.com (Peter Wood – Chief Executive)
Formal park Name		Sheffield Technology parks
Address Line 1		Cooper Buildings, Arundel Street – City Centre Site
Address Line 2		Sheffield S1 2NS
Fax		0114 - 22 11 801
Primary Focus		Science and Technology
Principal Owner/Investor		
Background		England's fourth largest city, Sheffield has the fastest growing economy outside of London. Sheffield's lifeblood is the success of organisations and industries, with an unrivalled reputation for manufacturing excellence, quality and innovation. Situated on the brink of the Peak District National Park, Sheffield is just minutes away from some of the most beautiful landscapes in the UK Did you know? • Sheffield provides the highest level of funding available anywhere across Europe. • Sheffield is one of the UK's most centrally located cities, offering the perfect gateway for road, rail and air transport. • Sheffield is home to excellent galleries, nationally renowned theatres and the high quality Meadowhall shopping centre.
Vision		We are creating a World-class Business Incubator for technology business in the digital, Information Technology, Internet, software and mutlimedia sectors. We endeavour to provide new start-up businesses with all the support and facilities they need. Sheffield Technology Parks provide world-class experienced, processional and timely mentored support enabling businesses to start-up, grow and prosper.

Map of Tech Park		
Availability of Finance and Investment Capital		Focused on incubator firms, Sheffield Technology Park offers its tenant firms financial advice and services. It has ties with multiple finance companies as well as government support programs. It is located in an special Economic area (Objective 1 Region) which means that the areas GDP is 85% below the EEC.
Assessment of Success or Failure		Sheffield Technology Park has a focus on local incubator firms. It has a high occupancy level. In general I believe this park is successful in its Mission. In conclusion, based upon secondary research, Sheffield Technology park is considered **SUCCESSFUL**. This is based upon the 3 identified Key Success Factors observed: The "Availability of Capital" through Venture Capital and support groups, The "Availability of Infrastructure" which includes access to an international airport and good telecommunication and data connectivity, The "Availability of Labor" namely proximity to universities, lastly "Favorable Public

Policy" through the EU's objective 1 region policy. STP has a growing tenant base in two locations, the City Centre site and the Don Valley site; both having a low vacancy rate.

KSFs or KFFs

1. Factor Conditions

a. Availability of Capital – Not only does financing firms provide working capital, they also provide additional support services to help the young start-ups companies run and manage their business. "Sheffield Technology Parks' incubation service will advise and assist technology and internet businesses by providing access to grants, loans and development funds.

Experienced advisors will help you develop your strategy, link you to a wide range of finance support and build that all-important business plan, underpinned with steadfast figures and details.

STP can introduce you to a wide range of funding bodies; each funder has its own set of criteria for awarding funds. STP will offer guidance and practical help in applying for funding. Each venture will have to satisfy the individual funding body requirements." [1]

- **Venture Capital** – STP has a strategic alliance with Fast Future Ventures Ltd. And have created a program called "Venturesphere". Venturesphere offers aspiring entrepreneurs access to start up grant funding, tailored mentoring support and serviced business accommodation packages. [1] There is also the presence of South Yorkshire Investment Fund (SYIF). South Yorkshire Investment Fund offers finance packages tailored to business's individual needs. We also offer access to business mentors and a network of private investors.[3]
- **Central Government Funding** - South Yorkshire is designated an Objective 1 region. This means that the GDP for the area is below 85% of the EEC average. [1] An Objective 1 region is:

Objective 1 of the Structural Funds is the main priority of the European Union's cohesion policy. In accordance with the treaty, the Union works to "promote harmonious development" and aims particularly to "narrow the gap between the development levels of the various regions". This is why more than 2/3 of the appropriations of the Structural Funds (more than EUR 135 billion) are allocated to helping areas lagging behind in their development ("Objective 1") where the gross domestic product (GDP) is below 75% of the Community average.

All these regions have a number of economic signals/indicators "in the red":

- low level of investment;
- a higher than average unemployment rate;
- lack of services for businesses and individuals;
- poor basic infrastructure.

Some fifty regions, home to 22% of the European population, are covered in the period 2000-06. The Structural Funds will support the takeoff of economic activities in these regions by providing them with the basic infrastructure they lack, whilst adapting and raising the level of trained human resources and encouraging investments in businesses. [2]

b. Availability of Infrastructure – Infrastructure is a key element in the success of STP. A technology park requires sophisticated up to date communication technology and STP provides it to their tenants.

- Availability of Flights and Airports – 33 miles from Manchester International Airport
- Modern communication infrastructure – Wire workplace Broadband connectivity
- Quality of Telecommunication services – Telephone connection and serviced switchboard

c. Availability of Labor – Presence of Skilled Labor due to proximity to multiple universities.

- Existence of Higher Education institutions – There are currently two major universities near STP. They are the University of Sheffield [4] and Sheffield Hallam University [5].

2. Public Policy

a. **Supporting Economic incentives**

- Fiscal incentives - Objective 1 Region [2] South Yorkshire is designated an Objective 1 region. This means that the GDP for the area is below 85% of the EEC average. [1]

Notes:

1 http://www.shefftechparks.com/business_funding.asp - Sheffield Technology park website.

2 http://europa.eu.int/comm/regional_policy/objective1/index_en.htm - Europa Objective 1: Supporting development in the less prosperous regions.

3 http://www.syif.com/ - South Yorkshire Investment Fund

4 http://www.wrce.org.uk/ - University of Sheffield website

5 http://www.shu.ac.uk/business/index.html - Sheffield Hallam University website

A1.3.6 National Technology Park, Ireland

<table>
<tr><th>1</th><th></th><th>PROFILE INFORMATION</th></tr>
<tr><td>Common Name of Technology Park</td><td></td><td>National Technology Park</td></tr>
<tr><td>Location</td><td></td><td>Limerick, Ireland</td></tr>
<tr><td>Phone</td><td></td><td>+353 61 503000</td></tr>
<tr><td>Email address</td><td></td><td>Email addresses are obscured – but email can be send to the following relevant contacts via the embedded website links below…
<table>
<tr><td>Knowledge Enterprise Director</td><td>Eugene Brennan</td><td>+353 61-710296</td></tr>
</table>
<table>
<tr><th colspan="3">Knowledge Enterprise</th></tr>
<tr><td>Irish Enterprise</td><td>Neil O'Sullivan</td><td>+353 61-410777</td></tr>
<tr><td>Knowledge Development</td><td>Alice Morgan</td><td>+353 61-503038</td></tr>
<tr><td>New Enterprise Development</td><td>John Dillon</td><td>+353 61-503204</td></tr>
<tr><td>Shannon Free Zone</td><td>Gerry Fitzmaurice</td><td>+353 61-710211</td></tr>
</table>
http://www.shannon-dev.ie/ContactUs/</td></tr>
<tr><td>Formal park Name</td><td></td><td>National Technology Park, Limerick</td></tr>
<tr><td>Address Line 1</td><td></td><td>O'Halloran Road, Castletroy,</td></tr>
<tr><td>Address Line 2</td><td></td><td>Limerick, Ireland</td></tr>
<tr><td>Fax</td><td></td><td>+353 61 338065</td></tr>
<tr><td>Primary Focus</td><td></td><td>I.C.T., materials and e-business</td></tr>
<tr><td>Principal Owner/Investor</td><td></td><td>Managed and developed by The National Technological Park Plassey Ltd, a wholly owned subsidiary company of Shannon Development.</td></tr>
<tr><td>Background</td><td></td><td>SEE UKSPA PROFILE HERE ALSO:
http://www.ukspa.org.uk/?channel_id=2473&editorial_id=13973

The National Technology Park Limerick was formally inaugurated in 1984 as the first Irish Science/Technology Park. It is managed and developed by The National Technological Park Plassey Ltd, a wholly owned subsidiary company of Shannon Development. This mandate includes the physical and infrastructural development of the Park as well as the encouragement of a process of innovation, linkage and technology diffusion.

The Park is currently home to more than 80 separate organisations in a balanced blend of multinational subsidiaries, Irish technology companies, InnovationWorks, R&D entities and support services employing over 3,000 people and occupying more than 25 separate</td></tr>
</table>

buildings with a floor area in excess of 130,000 sq. meters (1.4 million sq. ft.)

With the University of Limerick at its core and with active links to the Limerick Institute of Technology, the whole thrust of the Park's development has been to harness the technology resources on the site and particularly those at the University of Limerick campus towards the needs of enterprise and economic development.

As the Irish Government's regional development company for Ireland's Shannon Region (Counties Clare, Limerick and North Tipperary, and South Offaly and North Kerry) Shannon Development promotes and supports the establishment of new and the development and expansion of existing industrial and internationally-traded service firms.

The Company currently places particular emphasis on the development of high potential firms within the knowledge economy.

Shannon Development supports firms, which either currently do or are likely to achieve significant sales growth of €1m and employ in excess of 10 people within 3 years of start-up. Promoters of firms, which currently are and expect to remain below these figures should contact their local County or City Enterprise Board to discuss their business proposal or developmental needs.

http://www.shannon-dev.ie/AboutUs/
http://www.shannon-dev.ie/ntp/
Annual report 2004: http://www.shannon-dev.ie/NewsReleases/Documents/filename,2304,en.pdf
Annual report 2003: filename,2089,en.doc

National Technology Park

Ireland launched its National Technological Park in 1984, which hosts over 80 organizations employing close to 5,000 people on a 650-acre parkland site, which is situated near Limerick City (the capital of Ireland's Shannon Region). The National Technological Park has become home to a growing nucleus of high technology and knowledge-based companies, multinational subsidiaries, R&D entities and support services which occupy more than 30 buildings. International firms doing business at the park include Clarus, Cook Ireland, Digifone, Dell, Flextronics International, Worldcom, Modus Media, NETg Learning, Orygen, ComputerPREP, QAD, Sumicem and Vistakon (Johnson & Johnson).

		 The park is managed by Shannon Development (the Irish Government's Regional Development Company for Ireland's Shannon Region) in close partnership with the University of Limerick. [http://www.shannon-dev.ie/ntp/info_1.html]
Vision		We work in partnership with a wide variety of groups to maximise the potential for using information society expertise and local resources to generate employment and prosperity in the Shannon Region. **Regional Development** Shannon Development plays a key leadership role, in relation to important regional development issues, such as airport access, transport infrastructure, and broadband connectivity. Leading and encouraging regional development at urban and rural levels to ensure economic inclusion and balanced spatial development are among its key activities. Our overriding ambition for the Shannon Region is that it be regarded as the region of choice by the business community, by tourism product providers, and by residents and visitors alike. Our ability to do so lies in the diverse range of our activities, in maintaining the skills levels required to deliver a quality service to our clients, and on the continued support of our many partners throughout the region. This page contains links to a range of selected, which should be of interest and/or benefit to clients/partners of Shannon Development.
Mission		Shannon Development's primary focus is to lead and encourage the identification and development of solutions to the critical needs or obstacles to development in the region. The Company currently places particular emphasis on the development of high potential firms within the knowledge economy. **Business:** Shannon Development supports firms, which either currently or are likely to achieve significant sales growth of €1.3m and employ in excess of 10 people within 3 years of start-up. The range of business development programmes, services and supports offered by Shannon Development to both emerging and established firms, may be viewed here.

Entrepreneurship

Innovation and business development are to the forefront at the National Technology Park. Through a range of business development programmes, the Park and Shannon Development encourage and support the development of new, indigenous, high-potential firms.

InnovationWorks Limerick is a core entity of the National Technology Park. This digitally-networked business incubation centre, offers an integrated system for incubating and growing high-potential, indigenous companies. Its range of tailored business development programmes and supports have assisted in the development of numerous, indigenous firms, which are now world players in their respective niche markets. InnovationWorks Limerick is currently working with a selection of new, start-up firms, which are set to follows in their successful footsteps.

Established firms at the Park are encouraged and assisted to undertake innovative research and development programmes, which will ensure their continued success in the marketplace.

Location

Managed by Shannon Development in close partnership with the University of Limerick, the National Technology Park is a 650 acre parkland site, which is situated on the N7 (Limerick Dublin Road), just 3 miles from Limerick City (the capital of Ireland's Shannon Region).

Shannon International Airport, which is 19 miles from the Park, offers direct flights to London (with onward connections to destinations throughout the world) and to Atlanta, Boston, Chicago, Newark, New York and Los Angeles in the U.S.A.

Limerick City has daily rail connections to Dublin and Cork.

Facilities

Physical Environment

The University of Limerick is at the heart of the National Technology Park's 650 acres site, which is bounded by the Rivers Mulcair, Shannon and Groody on the Eastern, Northern and Western sides and by the N7 (Limerick Dublin Road) on the Southern side. Rich in natural vegetation, historical and archaeological features, the Park's natural quality has been enhanced through a landscaping and walks development programme to give it a high amenity character. The Park's management company (The National Technological Park Plassey Ltd.) works with various partners to provide a world-class business environment, which is networked to a modern University Campus. The physical master plan for the Park, combined with strict tenant eligibility criteria and development guidelines, ensures the very finest location for modern, technology companies.

Business Accommodation

The National Technology Park has been designed to meet the needs of high-technology and knowledge-based businesses by providing low density development in a high quality parkland environment. The Park provides a range of flexible business accommodation options for eligible activities.

Serviced Sites

Fully-serviced, industrial sites of 0.5 acres and upwards (in a quality landscaped environment) may be purchased or leased at the Park on which clients may construct facilities for approved usages. All construction work at the Park is subject to the Design Guidelines prepared by the Park's management company.

InnovationWorks Limerick

InnovationWorks Limerick provides an integrated system for incubating and growing knowledge-based high potential companies. Business accommodation is an element of this system.

Properties Available

A variety of business accommodation options is available at the Park.
To obtain details on properties, that are currently available, **Click Here**

- INTERNATIONAL BUSINESS CENTRE
  This is an office block development where units of 2,000sq.ft. upwards can be leased.
- INTERNATIONAL SCIENCE CENTRE
  The International Science Centre is a custom-built facility with high-quality office accommodation, where a unit of 10,000sq.ft. can be leased. The building's design allow for individual units to be finished-out to clients' specific requirements.
- PLASSEY ENTERPRISE CENTRE
  This facility has stand-alone units, suitable for light manufacturing or computer-based activities and ranging in size from 500sq.ft. to 9,000sq.ft.
- HAMILTON HOUSE
  Phase 2 of Hamilton House offers 45,000sq.ft. of flexible office accommodation, that is adaptable to meet the accommodation requirements of individual clients.
- ROSSE CENTRE
  3 office blocks of 8,000sq.ft. each offering units of flexible sizes to meet specific requirements of individual clients.

Property Brokerage

The Park's Management Company provides a brokerage service with private sector developers by arranging for customised business accommodation to be constructed to individual client specifications.

Telecomms

The National Technology Park is Ireland's first, digitally-networked, technology park. Through a joint-venture between Shannon Development and Esat Business, a broadband fibre-optic ring has been installed at the Park, which gives the Park's firms access to a range of integrated broadband services including: business voice, managed bandwidth, broadband L.A.N. interconnect, A.T.M. and frame relay, and Esat Net (e-mail, internet access and web hosting services, I.S.D.N. and dial-up connections).

The availability of this digital network facilitates the Park's firms in exploiting the immense opportunities, which exist to develop and expand their firms by embracing the potentials of e-business. Telecommunications service providers Esat Business, Digifone and Worldcom have facilities at the National Technology Park.

Recently, Shannon Broadband Ltd., a consortium comprising the Shannon Region's local authorities and led by Shannon Development commenced the installation of a broadband network throughout the Region, with the fibre optic cable being initially installed in the Limerick metropolitan area.

National Technology Park Limerick
Properties Available

Please click on any of the following 'Building Names' for further details:

Hamilton House
Phase 1 & Phase 2

Rosse Centre 1, 2 & 3

International Science Centre
Block 1 & Block 2

Walton House

Stewart Building

Callan Centre

Plassey Enterprise Centre
Unit 8

Flextronics Building

International Business Centre
Block 1 & Block 2

Ashling Building

Services

The National Technology Park provides a range of Park services including property planning, marketing, linkages to third level colleges, and I.T. services. The Park's management company is responsible for the overall, physical planning and development of the Park. In addition, the Park provides security services, landscaping and general maintenance of the Park's communal areas. The Park engages in a marketing programme, which is designed to promote and maintain the National Technology Park as Ireland's premier location for technology businesses. Through its membership of Science & Technology Park organisations such as A.U.R.R.P., I.A.S.P. and U.K.S.P.A., the Park's management company is constantly bench-marking the Park with developments at overseas parks, so that the Park maintains its world-class, leading-edge position.

The National Technology Park promotes the development of linkages between the Park's client firms and Limerick's third level colleges the University of Limerick and the Limerick Institute of Technology.

As a result of the creation of a number of joint venture between Shannon Development and third parties, broadband connectivity is available to firms operating at the Park.

Price/Rent

Hamilton House

Phase 1 & Phase 2

Rent Amount:	Phase 1: €17.50 per sq.ft. per annum Phase 2: €14.00 per sq.ft. per annum (for space greater than 3,000 sq.ft.) €15.00 per sq.ft. otherwise
Service Charge:	Phase 1: €2.50 per sq.ft. approx. Phase 2: €2.00 per sq.ft. estimated
Fit-out Arrangements for Phase 1:	The floor is fully-fitted to include: Computer Cabling Raised Access Floors Suspended Ceilings Lighting Air Conditioning Rest Rooms Floor Coverings & some Meeting Rooms
Fit-out Arrangements for Phase 2:	Shell specification. (Fit-out will be considered by landlord subject to details being provided by tenant).

Lease Period:	25 years with 5 Yearly Rent Reviews (Applicable to Phase 1 & Phase 2)
Break Clause:	Available subject to negotiation (Applicable to Phase 1 & Phase 2)
Space Available:	Phase 1 : First Floor 7,000 sq.ft. – 14,000 sq.ft. Phase 2: 3,000 sq.ft. – 40,000 sq.ft. (Entire Building)

Rosse Centres 1, 2 & 3

Rent Amount:	€18.00 per sq.ft. per annum including service charge and fully-furnished.
Service Charge Covers:	Maintenance Heating Insurance on the building Cleaning of the building externally
Fit-out Arrangements:	Fit-out to client(s)' specific needs will be arranged following negotiation with client(s) and can be rentalised over the period

	of the lease.
Lease Period:	Short term and long term lease arrangements are available.
Break Clause:	Negotiable
Space Available:	Rosse Centre 1: 8,000 sq.ft. – Fully Occupied Rosse Centre 2: 8,000 sq.ft. – 1,700 sq.ft. Available Rosse Centre 3: 8,000 sq.ft. – Fully Occupied

International Science Centre

(Block 1 & Block 2)

Rent Amount:	Block 1: €15.25 per sq.ft. per annum Block 2: €12.70 per sq.ft. per annum (Shell & Core)
Service Charge:	Block 1: €2.81 per sq.ft. per annum Block 2: No Service Charge
Fit-out	Fit-out to clients' specific needs will be arranged

Arrangements:	following negotiation and can be rentalised over the period of the lease.
Lease Period:	Negotiable
Break Clause:	Negotiable
Space Available:	Block 1: 18,934 sq.ft. available – varying in size from 3,800 sq.ft. to 5,100 sq.ft. Block 2: 1 unit of 10,965 sq.ft. available.

WALTON HOUSE

Sale Price Reserve:	€2,500,000
Rent Amount:	€15.00 per sq.ft. per annum including service charge.
Fit-out Arrangements:	Rent i ncludes fit-out
Lease Period:	Negotiable

Break Clause:	Negotiable
Space Available:	One unit of 18,000 sq.ft. is available

Stewart Building

Rent Amount :	€15.20 per sq.ft. per annum
Service Charge :	€1.85 per sq.ft. (approx)
Fit-out Arrangements :	The building includes the following fit-out facilities: Air conditioning Acoustic tiled suspended ceiling Plastered category two lighting Lift access Fully fitted kitchenette Fully fitted toilets
Lease Period :	Available on application.
Break Clause :	Negotiable

Space Available :	20,000sq.ft. Available

Callan Centre

Ground Floor

Rent Amount :	€19.00 per sq.ft. per annum
Service Charge:	€2.60 per sq.ft. per annum to include:
	Lift maintenance Landscaping externally Public lighting Heating & lighting of common areas internally
Fit Out Arrangements:	Rent includes fit out
Lease Period :	10 years
Break Clause :	5 year break clause
Space Available :	1,980 sq.ft. available

Plassey Enterprise Centre UNIT 8

Rent Amount:	€13.00 per sq.ft. per annum
Service Charge:	€3.50 per sq.ft. per annum to include: * Heating, cleaning & lighting of common areas * Landscaping
Fit-out Arrangements:	Rent i ncludes fit-out
Lease Period:	Year-to-year Licence Agreement
Space Available:	7,000 sq.ft. divided into eight units varying in size from 700 sq.ft. to 1,600 sq.ft. with 1,000 sq.ft. currently available.

International Business Centre
(Block 1 & Block 2)

Rent Amount:	Block 1: €15.25 per sq.ft. per annum
	Block 2: €15.25 per sq.ft. per annum
Service Charge:	Block 1: €0.15 per sq.ft. per annum
	Block 2: €3.54 per sq.ft. per annum
Fit-out Arrangements:	Fit-out to clients' specific needs will be arranged following negotiation with clients and can be rentalised over the period of the lease.
Lease Period:	Negotiable
Break Clause:	Negotiable

Space Available:	Block 1: 10,495 sq.ft. available – varying in size from 2,110 sq.ft. to 6,000 sq.ft. Block 2: 10,214 sq.ft. available – varying in size from1,500 sq.ft. to 6,749 sq.ft

Flextronics Building

Rent Amount:	€6.00 per sq.ft. per annum
Service Charge:	€0.16 per sq.ft. per annum
Building Specifications:	* High specification open-plan offices * 120m run in manufacturing area

	* Canteen * Electrostatic flooring finish to manufacturing area * Loading bays
Space Available:	100,000 sq.ft. Available
Lease Period:	Negotiable
Break Clause:	Negotiable
Building Purchase:	Building also available for purchase

Ashling Building

Lessor:	Ashling Microsystems Ltd., Lonsdale Road, National Technology Park, Limerick.
Premises :	Fully-fitted, first floor premises

	• 4 large furnished offices • Boardroom • Open-plan area
Sub-lease Duration :	3 – 5 years
Area Available:	2,000 sq.ft.
Lease Rate:	€15 per sq.ft.
Common Areas:	• Lobby and reception area • Free car parking
Tenant Responsibilities:	• Heating • E.S.B. • Rates • Building insurance on a pro-rata basis
Tenant Contributions:	• Skip removal costs • Landscaping • Security • Cleaning of common areas
Other Conditions:	Tenant will be responsible for maintenance and upkeep internally and externally and will pay any reinstatement costs necessary at the end of the lease term. Any reinstatement to be done will be determined by reference to an agreed report on the condition of the premises at the beginning of the lease.
Contact Details:	John Murphy, Ashling Microsystems Ltd. Tel.: (061) 334466 Fax: (061) 334477 Email: john.murphy@ashling.com

Principal Technologies in Tech park		The park is an influential nucleus of high-technology and knowledge-based companies. The Park has a balanced mix of multinational subsidiaries, Irish technology companies, R&D entities and support services,
Availability of Human Capital		**AlumniStart Programme** Working in partnership with the Shannon Region's third level colleges, Shannon Development targets alumni from the Shannon Region, who are interested in launching and developing high potential firms in the Region. The National Technology Park works closely with the University of Limerick Alumni Association to promote entrepreneurship among its members. For details on AlumniStart, click here. **E-Networks** The Park networks with a number of third level colleges and organisations in Limerick including: **University of Limerick** The University of Limerick, which is at the heart of the National Technology Park, admitted its first students in 1972. From the outset, there were close relationships between the University and Shannon Development. It was the relationship between

		these two institutions, together with that of IDA Ireland (the National Agency for inward investment promotion), which provided the dynamic for the establishment of the Park. A central activity for the Park's Management Company is to ensure the optimum usage of University resources and services by client companies. The University offers a range of programmes to doctorate and post-doctorate levels in the disciplines of Business, Education, Engineering, Informatics & Electronics, Humanities and Science. University of Limerick undergraduates participate in a Co-Operative Education Programme of placement in industry, commerce and the professions. Almost 2,000 undergraduate placements are made annually among a network of over 1,000 employers (in Ireland and abroad) in one of the largest Co-Operative Education Programmes in Europe. Research activity is central to the University's mission, combining excellence with application to real-world issues. In this context, industrial and social needs can be met by the broad range of fundamental and applied research activities provided through the University's Research Centres. The broad strategic research areas of the University are: Complex Computer Systems, Entrepreneurship, European Studies, Materials and Surface Science, Music & Dance and Teacher Education. The existence of this strategic research base enables industry to access these technologies more easily, both for innovation in existing products and developments into higher value-added areas. The extensive information resources of the University can be accessed via the Business & Technical Information Services Unit (BTiS). This service is widely used by companies in accessing patent information, technical standards data and published corporate information. The University's Department of Adult and Continuing Education aims to offer lifelong learning opportunities through the provision of award-bearing courses for individuals, who wish to upgrade their skills, and a range of self-development, leisure-learning courses. This Department also acts as a one-stop shop for companies and organisations, that wish to source education and training with the University. The University's Technology & Enterprise Development Unit (T.E.D.U.) was established to commercialise the expertise of the University of Limerick. To this end, T.E.D.U. is developing programmes to stimulate, promote, support and commercialise innovation concepts drawn from R&D ongoing at the University, both at institutional and individual levels. The University's 18th Century Plassey House, which accommodates the University's administrative centre, is at the heart of the fine country estate on which the Park has been developed. Today, Plassey House is also home to the University Club, which gives representatives of Park organisations, the academic community and visitors a place to meet, dine and interact. **Limerick Institute of Technology** The Limerick Institute of Technology has campuses at Moylish Park and Clare Street in Limerick. The Institute offers a range of courses to Diploma and Degree level in Science and Information Technology, Electrical and Electronic Engineering, Communications, Mechanical and Automobile Engineering, Management Studies, the Built Environment, and Art and Design.
Availability of Finance and Investment Capital		**The following documents contain a great deal of of specific financal information:** Annual report 2004: http://www.shannon-dev.ie/NewsReleases/Documents/filename,2304,en.pdf Annual report 2003: local file: filename,2089,en.doc

I am not inlining them in this section since there is too much content (http://www.shannon-dev.ie/NewsReleases/AnnualReport/)

This following material are the guidelines on what is available…

Financial Investment

- Grants for feasibility studies, research and development, employment, human resources development and strategic development.
- Equity finance as an element of the overall package.
- Allied with Shannon Development's direct investment in new projects, InnovationWorks Limerick's Venture Capital Advisory Unit will collaborate with private sector sources of finance including capital providers to generate further financial investment options as new projects develop and grow.
  For details on the range of financial supports available from Shannon Development, Click here.

Shannon Development has revised the structure of its business development financial incentives. The intention is to have a clearer funding structure, which is more suited to individual client company's competitive needs. For details on the range of business development financial incentives, **CLICK HERE.**

See the content of: http://www.shannon-dev.ie/Business/Documents/filename,2263,en.pdf

FINANCIAL INCENTIVES for INDIGENOUS INDUSTRY

INTRODUCTION

Against a background of a rapidly changing marketplace and a new generation of companies and industries, Shannon Development has revised its funding structure so that it is more suited to your company's competitive demands. Starting global businesses, developing innovative products and processes, achieving competitiveness and productivity improvement, implementing expansion projects and growing overseas through effective internationalisation are highly resource-intensive. The new supports offer indigenous companies a complete business creation and development package.

Shannon Development's range of financial supports for firms in the Shannon Region (Counties Clare, Limerick and North Tipperary, and South-West Offaly and North Kerry) will provide clients with a holistic and flexible approach addressing all elements of their business development requirements. To ensure that the benefit from the Shannon Development investments and supports are maximised, Shannon Development will agree targets and deliverables with clients linked to the various supports. This will allow for effective monitoring and evaluation of the assistance provided.

The new financial supports package combines Shannon Development's own business strategy with your needs as a client, and links them to export growth, productivity and employment. It also takes into account national policy on regional development. Its objective is to assist companies, that can clearly demonstrate a need for financial support. If your company applies for funding, Shannon Development will consider your application quickly; assess it according to commercial criteria and legislative guidelines; determine need for assistance and inform you of the outcome.

Overall, this package of financial supports is designed to:
- meet your needs as a client more effectively
- address issues currently facing you such as increased competitiveness
- respond to regional differences and variances
- deliver a better return to the tax-payer on committed revenue

The range of financial incentives outlined in this brochure applies to manufacturing and internationally-traded services client companies and potential client companies of Shannon Development.

ELIGIBILITY FOR FINANCIAL SUPPORTS

Your firm's eligibility to apply for funding will depend on its stage of development, with different support packages available for start-up and established companies. Support for start-ups concentrates on getting you up and running, whereas supports for expansion and enhanced business projects are the focus for established companies.

Overall, financial support from Shannon Development is designed to:
- help you address the issues you are currently facing
- respond to regional differences and variances
- deliver a better return to the tax payer

What is my company's stage of development?

Shannon Development works with companies involved in both the start-up phase and the established phase. Funding differs for these two phases or stages of development, so it is important to decide into which phase your business best fits.

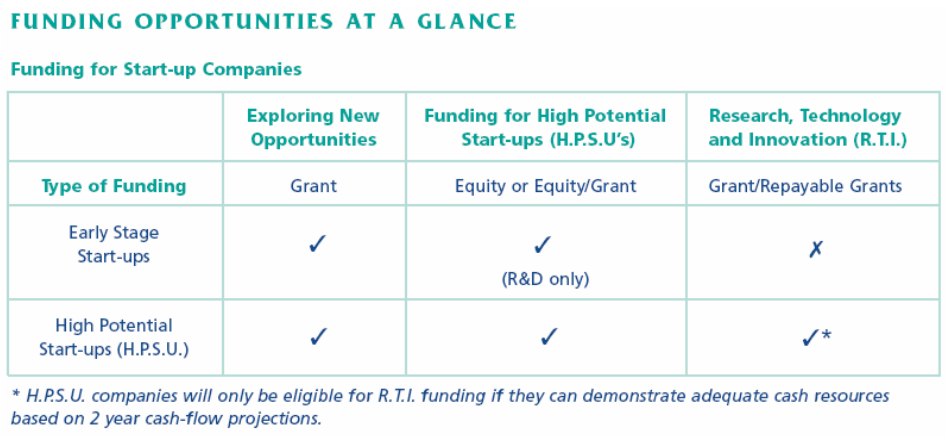
Start-up Companies

Shannon Development deals with start-up businesses, which it defines as having "high potential". A high potential start-up company (H.P.S.U.) is defined as one, which:
- has a product or service, that is based on technological innovation
- is likely to achieve significant growth in three years (sales of €1m per annum and employment of greater than 10 employees)
- has projected sales with a heavy export orientation
- is ideally led by an experienced team, that has a mixture of technical and commercial competencies

This definition includes early-stage H.P.S.U's – product-led R&D companies, which have the potential to achieve the above export and employment criteria following the successful completion of a defined pre-commercialisation phase.

Established companies

Established companies are defined as Irish-based manufacturing or internationally-traded services S.M.E's and large companies, which have been incorporated and trading for at least five years.

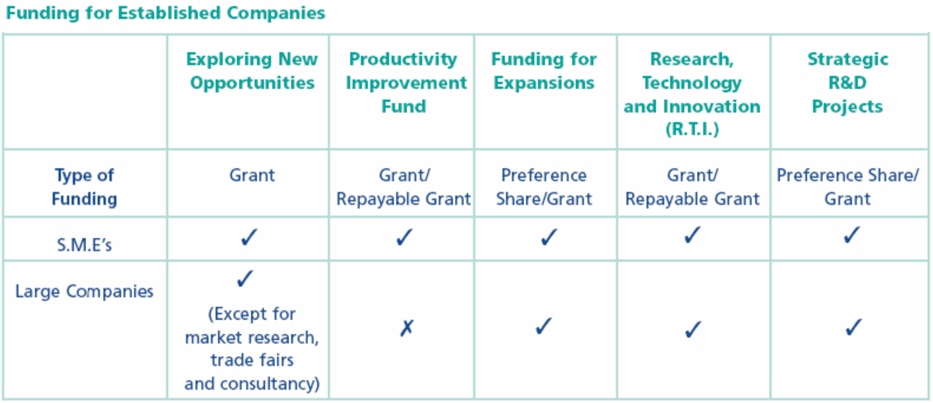


FUNDING OPPORTUNITIES AT A GLANCE

Funding for Start-up Companies

	Exploring New Opportunities	Funding for High Potential Start-ups (H.P.S.U's)	Research, Technology and Innovation (R.T.I.)
Type of Funding	Grant	Equity or Equity/Grant	Grant/Repayable Grants
Early Stage Start-ups	✓	✓ (R&D only)	✗
High Potential Start-ups (H.P.S.U.)	✓	✓	✓*

** H.P.S.U. companies will only be eligible for R.T.I. funding if they can demonstrate adequate cash resources based on 2 year cash-flow projections.*



Funding for Established Companies

	Exploring New Opportunities	Productivity Improvement Fund	Funding for Expansions	Research, Technology and Innovation (R.T.I.)	Strategic R&D Projects
Type of Funding	Grant	Grant/ Repayable Grant	Preference Share/Grant	Grant/ Repayable Grant	Preference Share/ Grant
S.M.E's	✓	✓	✓	✓	✓
Large Companies	✓ (Except for market research, trade fairs and consultancy)	✗	✓	✓	✓

EXPLORING NEW OPPORTUNITIES

Investigating new ideas and markets is an essential aspect of business development. Funding for exploring new opportunities can provide financial assistance towards supporting your business needs as you pursue new growth strategies.

Shannon Development offers grant support for various types of consultancy and feasibility studies, market research, participation at trade fairs, mentors, training and recruitment of a key manager for one year. Maximum funding support of €65,000 within a rolling two year period for any of the combined activities under this category is available. You will be required to clearly demonstrate your need for funding assistance.

Do I qualify?

You are eligible to apply for this funding if you are one of the following:

- a new high potential start-up or
- a manufacturing or internationally traded services company employing 10 or more persons

Feasibility study funding may be available for individuals or groups with a business idea, which they wish to develop.

Large companies (companies employing more than 249 employees) are not eligible to apply for market research, consultancy and trade fairs.

Project ideas should be discussed with your Development Adviser prior to submitting a completed application form to Shannon Development. If you are not already a client, please contact your nearest Shannon Development office.

FUNDING FOR HIGH POTENTIAL START-UPS (H.P.S.U's)

Starting a new company with the potential to export and grow quickly requires a good business idea, ambitious and effective management, and finance. Shannon Development provides both advice and financial assistance to entrepreneurs, who have a business plan that is underpinned by realistic projections of rapid growth in export sales.

The H.P.S.U. support package matches the financial needs of your new company by providing finance as you get started and by sharing the risk dynamic with you. Funding is available for investment in R&D, training, job creation and capital assets.

Depending upon the level of risk, funding is either 100% equity or a mixture of equity and grant. Shannon Development will take up to a maximum of 10% of your company's ordinary share capital. If Shannon Development's equity investment reaches 10% of the ordinary share capital, the remaining equity will be in the form of redeemable preference shares. Shannon Development's funding will need to be matched by private investment from, for example, company promoters, a business expansion scheme or venture capital. In exceptional circumstances, at the early stage of a start-up, if you are not able to access adequate private sector funding, Shannon Development may consider making an investment in your company. Support in this instance will be for R&D and will be in the form of equity. In such cases, the initial funding package will be approved against agreed milestones, such as:

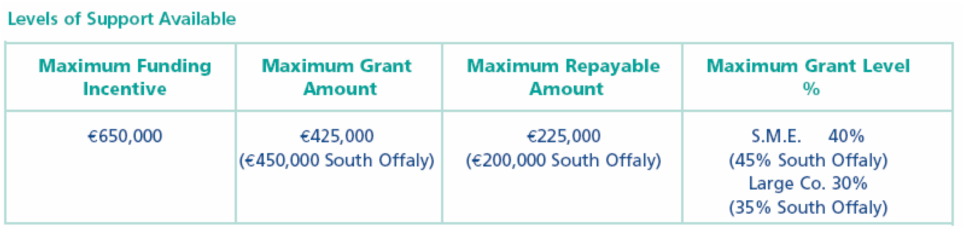
- establishment of a formal R&D department
- development of a product prototype
- achievement of a customer reference site
- sourcing new equity

Once the high risk, early phase is over and the agreed milestones have been achieved, your company may qualify for the normal grant/equity package. Shannon Development is likely to invest initially via convertible preference shares which, when converted, will not exceed 10% of the ordinary share capital of the company.

Do I qualify?
You are eligible to apply for this funding, if you are a new start-up manufacturing or internationally-traded services company. The total amount of funding available will be determined by a number of factors, including your company's need for financial support, anticipated export growth, potential employment and regional location.

RESEARCH, TECHNOLOGY & INNOVATION (R.T. I .)

R.T.I. is designed to help you meet today's business challenges by further stimulating your research and development performance. It supports commercially-focused, industry-led projects in product and process development. Funding is in the form of grant/repayable grant. Repayability is linked to the successful completion of the R&D project and the achievement of agreed business targets, where projects involve a higher degree of risk.



Levels of Support Available

Maximum Funding Incentive	Maximum Grant Amount	Maximum Repayable Amount	Maximum Grant Level %
€650,000	€425,000 (€450,000 South Offaly)	€225,000 (€200,000 South Offaly)	S.M.E. 40% (45% South Offaly) Large Co. 30% (35% South Offaly)

Do I qualify?
You are eligible to apply for funding, if your company is an Irish-based manufacturing or internationally-traded services company, which can show adequate cash resources to implement the proposed R&D project. S.M.E. and large companies are eligible to apply.
If your company is at a very early stage of development and has restricted cash resources, contact Shannon

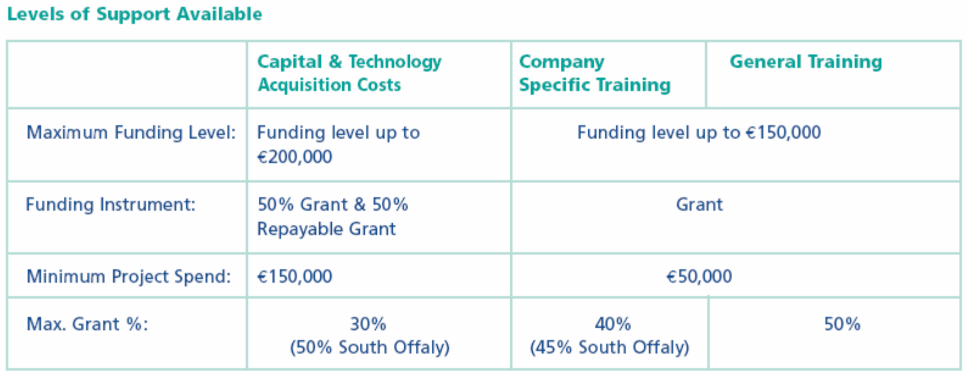
Development directly for details of alternative funding programmes. Proposals for funding will be accepted every month. Funding will be awarded on a competitive basis for projects with expenditure greater than €95,200. Projects with expenditure of less than €95,200 are awarded on a non-competitive basis.

PRODUCTIVITY IMPROVEMENT FUND

Building competitiveness has become a priority in the face of growing international pressure. The Productivity Improvement Fund is designed to assist small and medium-sized enterprises to achieve greater competitiveness by improving their export potential.

This will be achieved by increasing both their gross output and gross productivity, while also providing new employment or maintaining existing employment levels. Activities covered by the fund include:

- capital investment, for example in machinery and/or automation equipment
- technology acquisition
- management and staff training



Levels of Support Available

	Capital & Technology Acquisition Costs	Company Specific Training	General Training
Maximum Funding Level:	Funding level up to €200,000	Funding level up to €150,000	
Funding Instrument:	50% Grant & 50% Repayable Grant	Grant	
Minimum Project Spend:	€150,000	€50,000	
Max. Grant %:	30% (50% South Offaly)	40% (45% South Offaly)	50%

Proposals for funding will be accepted every month and funding is awarded on a competitive basis. The Approvals Committee will examine the proposal according to the criteria outlined in the section "How will my proposal be assessed?" In addition, applications for the fund will be further assessed by Shannon Development's & Enterprise Ireland's Commercial and Technical Assessors.

The Approvals Committee will be presented with an assessment of the project outlining the expected impact of the proposed project on your company's overall productivity and future competitive position internationally.

Do I qualify?
You are eligible to apply for this funding, if your company:
- is a S.M.E. involved in manufacturing or internationally-traded services
- has been incorporated and trading for at least five years
- has not been approved for financial support (excluding R.T.I.) in excess of €200,000 from Shannon Development in the two years prior to this application for funding

FUNDING FOR EXPANSIONS

Shannon Development can help you implement your expansion plans to increase your firm's level of exports. The funding package is negotiated on a one-to-one basis and funding for R&D, training and management development, capital assets and job creation can be supported.

Funding will be in the form of:
- preference Shares for capital assets and job creation
- grants for management development and training
- preference shares/grants for research and development

The total amount of funding available will be determined by the need for financial support for your project, as well as by anticipated export growth, potential employment and regional location.

Do I qualify?
You are eligible to apply for this funding if your company is an existing manufacturing or internationally-traded services company, employing 10 or more people. Typically, companies are existing clients of Shannon Development.

Your Development Adviser will work with you to put-together a development plan, which will then be brought forward to a decision-making committee for funding approval.

STRATEGIC R&D PROJECTS

Shannon Development encourages significant R&D projects and will discuss funding for these projects on an individual company basis. Projects could include the establishment of an R&D facility or a significant R&D initiative over a three year time frame. Such projects will be expected to include some form of collaboration with a third level institute.

Funding will be in the form of preference shares/grant. The total amount of funding available will be determined by the need for financial support for your project, as well as by anticipated export growth, potential employment and regional location.

Do I qualify?
You are eligible to apply for this funding if your company is an existing manufacturing or internationally-traded services company, employing 10 or more people. Typically, companies are existing clients of Shannon Development.

Your Development Adviser will work with you to put-together a development plan, which will then be brought forward to a decision-making committee for funding approval.

HOW WILL MY PROPOSAL BE ASSESSED?

Applications for funding will be presented to a relevant Approvals Committee made up of Shannon Development executives and public and private sector representatives.

Key considerations in assessing applications include:
- The need for financial assistance
- Value for money
- Commercial considerations
- Technical considerations
- Financial track record

In arriving at a decision, the Approvals Committee also takes into consideration any relevant regulations, including E.U. state-aid rules and policy direction from the Department of Enterprise, Trade and Employment.

When a decision on whether to approve funding or not has been reached, and the appropriate amount of funding has been determined, you will be informed by Shannon Development of the outcome. If your application is successful, Shannon Development will contact you regarding the necessary legal agreement and the funding claims and payment procedures.

Application Process
- Application is submitted & agreed development plan
- Evaluation by relevant committee
- Issue of Letter of Offer & legal agreement documentation
- Claims validation process
- Payment of funding

Note
This brochure outlines the maximum aid rates, which may be available for each category of support. Subject to eligibility and need, Shannon Development, in consultation with individual companies, will negotiate the appropriate funding package for a company on the basis of value for money for the State. This may vary from the maxima described here. The amounts and aid rates outlined in this document are correct at time of print and are subject to change.

YOUR NEXT STEP

To receive further information on Shannon Development’s range of financial supports or to discuss your business proposal with a Development Adviser, contact Shannon Development’s Head Office in Shannon or your local Shannon Development office.
NOTE: Firms which currently do or will employ less than 10 people should contact their local County/City Enterprise Board.

Shannon Development,
Town Centre,
Shannon,
Co. Clare.
Tel.: (061) 361555
Fax: (061) 361903
Email: business@shannondev.ie
Web: www.shannondev.ie

Clare:
InnovationWorks,
Information Age Park Ennis,
Ennis,
Co. Clare.
Tel.: (065) 6895000
Fax: (065) 6895010

Limerick:
InnovationWorks, The Granary,
National Technology Park, Michael Street,
Limerick. Limerick.
Tel.: (061) 338177 Tel.: (061) 410777
Fax: (061) 338065 Fax: (061) 315634
Funded by the Irish Government and part-financed by the
European Union under the National Development Plan, 2000–2006.

North Tipperary:
Connolly Street, InnovationWorks,
Nenagh, Tipperary Technology Park,
Co. Tipperary. Thurles, Co. Tipperary.
Tel.: (067) 32100 Tel.: (0504) 29300
Fax: (067) 33418 Fax: (0504) 29305

South-West Offaly:
Birr Technology Centre,
Mill Island,
Birr,
Co. Offaly.
Tel.: (0509) 20440
Fax: (0509) 20660

North Kerry:
InnnovationWorks,
Kerry Technology Park,
Tralee,
Co. Kerry.
Tel.: (066) 7190000
Fax: (066) 7190070

Resources and Incentives

InnovationWorks Limerick

Introduction

InnovationWorks Limerick is an integrated element of the Shannon Development Knowledge Network. Formerly known as "The Innovation Centre" – Ireland's first digitally-networked business incubation centre – InnovationWorks Limerick was established by Shannon Development in 1980 at the National Technology Park. It plays a pivotal role in Shannon Development's responsibility for the promotion and development of new, indigenous industry in the Shannon Region and concentrates on the development of knowledge and technology-intensive, high growth businesses.

InnovationWorks Limerick is a licensed member of the E.B.N. – the European Community's Network of Business Incubation Centres and of the N.B.I.A. – the National Business Incubation Association, U.S.A.

Offering an integrated system for growing high potential, technology and knowledge-intensive companies, InnovationWorks Limerick also provides its clients with international market and technology access through the network of 110 B.I.C's located throughout Europe.

Companies Assisted

InnovationWorks Limerick provides an integrated system for incubating and growing high potential companies, which have the following characteristics:

- Comprise a venture team
- Are technology or knowledge-intensive
- Generate internationally-traded output
- Provide skilled employment
- Programmes & Facilities

InnovationWorks Limerick offers a range of quality business incubation and growth programmes and facilities, which are tailored to meet the needs of individual client companies.

Through many years of working with entrepreneurs, Shannon Development has developed and refined what has become its Venture Development Process.

Shannon Development's Venture Development Process encapsulates the various stages of business development from idea generation, through the feasibility study stage, to project development and market launch, and business expansion. To view further details on the Venture Development Process, click here.

The Venture Development Process encompasses an integrated package of business development programmes, which are offered by Shannon Development.

VentureStart (1) Programme

VentureStart (1) is an introductory business development programme for entrepreneurs. The Programme is held on a rotating cycle during the year. For details on the typical contents of the VentureStart (1) Programme and the most recent version of the Programme, please click here.

VentureStart (2) Programme

VentureStart (2) is an intensive programme focussed on entrepreneurship and project development to initial project launch stage. Like the VentureStart (1) Programme, VentureStart (2) is also held on a rotating cycle during the year. For details on the typical contents of the VentureStart (2) Programme and the most recent version of the Programme, click here.

Excellerator Programme

A public/private partnership with accountancy practice Ernst & Young, Excellerator is a growth & development programme for established, early-stage, high potential firms. For details on the Excellerator Programme, contact InnovationWorks Limerick.

Internationalisation Programme

The Internationalisation Programme is a capability building programme for high potential start-up companies (H.P.S.U.), which will be developed and delivered on a one to one basis to participating companies. The Programme has been designed by Shannon Development to operate through its network of InnovationWorks located throughout the Shannon Region.

The Internationalisation Programme is held on a rotating cycle during the year. For details on the typical contents of the Internationalisation Programme and the most recent version of the Programme, click here.

Alu mniStart Programme

Working in partnership with the third level colleges, Shannon Development targets alumni from the Shannon Region, who are interested in launching and developing high potential firms in the Region. For details on AlumniStart, click here.

Early-Stage Venture Support

- Access to research services
- Technology assessment and development
- Business planning
- Corporate structuring and strategic development
- Market entry and launch strategies

Financial Investment

- Grants for feasibility studies, research and development, employment, human resources development and strategic development.
- Equity finance as an element of the overall package.
- Allied with Shannon Development's direct investment in new projects, InnovationWorks Limerick's Venture Capital Advisory Unit will collaborate with private sector sources of finance including capital providers to generate further financial investment options as new projects develop and grow.
For details on the range of financial supports available from Shannon

Development, Click here.

Marketplace Networks & Linkages

Through InnovationWorks Limerick, Shannon Development offers client companies access to a range of marketplace networks and linkages for both new and growing companies including Shannon Development's and Enterprise Ireland's overseas offices, the E.B.N. network and the N.B.I.A.

Contact Details

Shannon Development's office hours at InnovationWorks Limerick are:
Monday – Friday, 9.30a.m. – 5.30p.m.
Closed for lunch 1.00p.m. – 2.00p.m.

Shannon Development,
InnovationWorks Limerick,
National Technology Park,
Limerick, Ireland.
Tel.: +353-61-338177
Fax: +353-61-338065

Information Request

To receive further information on InnovationWorks Limerick, its facilities, and business development programmes and supports, please click here.

Regional Production System Linkages

http://www.shannon-dev.ie/business/developingyourbusiness/index.html

Sector Development Programmes

Shannon Development operates a number of s ectoral development programmes to develop the Region's indigenous industry on a sectoral basis and a number of programmes are currently being offered to interested firms. A strong focus is being put on the Services Sector. Service businesses play a vital role in the process of wealth creation and in the competitiveness of the economy as a whole. In addition, the growth of international trade in services further increases their potential as a source of wealth and employment creation.

Sub-Supply Sector

The indigenous Engineering and Electronics Sub-Supply Sector in the Shannon Region is emerging as a significant element of growth in industrial employment in the Region. To further strengthen the ability of this sector to create jobs and to attain greater relative regional advantage, Shannon Development focuses resources on developing competitiveness and expanding this Sector. The objectives are to develop the Shannon Region into a world class source of sub-supply for the engineering & electronics industries.

Campus Industry Programme

The Programme has two broad objectives, namely campus enterprise development and industry linkage. The campus enterprise development element of the Programme promotes and supports the creation of a greater number of new campus enterprises, while t he industry linkage element aims to enhance the linkage and collaboration between local industry and the Shannon Region's third level colleges. For details on the Campus Industry Programme, click here.

See: http://www.shannon-dev.ie/Business/Documents/filename,1888,en.pdf

Campus IndustryProgramme

Shannon Development

Knowledge Network

INTRODUCTION

An initiative of Shannon Development, the Campus Industry Programme has two broad objectives, namely campus enterprise development and industry linkage. The campus enterprise development element of the Programme promotes and supports the creation of a greater number of new campus enterprises, while the industry linkage element aims to enhance the linkage and collaboration between local industry and the Shannon Region's third level colleges. Third level colleges are a source of innovative technologies, capabilities, up-to-date knowledge and information, which can be of immense assistance in the development of new enterprises and also in the development and future competitiveness of existing local industries.

The Campus Industry Programme is operated in partnership with the Region's industry and third level colleges – the University of Limerick; Limerick Institute of Technology; Institute of Technology Tralee; Tipperary Institute, Thurles, and Mary Immaculate College, Limerick.

CAMPUS ENTERPTRISE

Throughout the world, commercialisation of research within third level colleges is a high priority and campus companies are seen by many as the future giants of technology and international business. The Shannon Region's third level colleges are a hot bed of new, high potential, knowledge-based businesses – an asset which is both recognised and encouraged by Shannon Development through its Campus Industry Programme.

High potential businesses are defined as those, which have the following characteristics:
- A talented and experienced team of entrepreneurs
- Value-added technology or product offering with a growing market
- Focus on growing international market share, revenue and profits
- A robust and growth-orientated business plan
- Capable of providing high-value employment

Eligible candidates for the campus enterprise development initiative are:
- Academics and researchers of third level colleges
- Campus companies
- Graduates of third level colleges
- College staff

The primary focus of this initiative is to encourage such people to seriously consider the option of commercialising their research by starting new businesses.

The range of business development services and supports available through the campus enterprise development initiative include:

- Financial support – the Commercialisation of Research & Development (C.O.R.D.) Fund
- One-to-one business advice and support clinics
- Information on, and access to, a range of national and E.U. funded programmes, such as the Research Innovation Fund
- Awareness talks for academics & researchers
- Research commercialisation seminars and workshops
- Intellectual property advice and support
- Mentoring
- Campus industry networking opportunities
- Shannon Development's Network of InnovationWorks, which offers a tailored, integrated package of business development supports, services and facilities.

Developing new campus enterprises is seen as being of immense importance for our future economic development, both regionally and nationally. The business development supports and services offered by the Programme to academics, researchers and graduates are specifically geared to their particular needs and stages of development and all have the primary objective of promoting and assisting the generation of new, high potential, start-up businesses.

INDUSTRY LINKAGE

The primary aim of the industry linkage initiative is to make industry more aware of the expertise and capability within the Region's third level colleges. It seeks to promote and encourage technology transfer from all the colleges to industry, thereby leading to the development of companies, which are more competitive in the marketplace.

The initiative also aims to develop a greater understanding among the colleges' academics and researchers of the commercial environment in which local industries operate on a day-to-day basis and to provide the colleges with an appreciation of the technical and other related business needs of companies. This two-way information flow will assist colleges in ensuring that their research work has a high commercial focus.

The range of services and supports available under the industry linkage initiative are designed to increase the level of knowledge transfer between local industries and the Shannon Region's third level colleges.

These supports and services include:

- Technology transfer programme
- Information on, and access to, a variety of national and E.U. funded programmes, such as Innovation Partnerships
- Industry-academic network groupings
- College open days for industry sectors
- Conference, workshop and seminar hosting

FURTHER INFORMATION

To receive further details of the Campus Industry Programme or on any of the business development supports and services offered by Shannon Development, contact:

Campus Industry Programme Office,
Shannon Development,
The Granary,
Michael Street, Limerick.
T +353 61 410 777
F +353 61 315 634
E kellyn@shannondev.ie
www.shannondev.ie

or any of the following Shannon Development offices:
Shannon Development, Shannon Development,
Information Age Park Ennis, Kerry Technology Park,
Ennis, Co. Clare. Tralee, Co. Kerry.

T +353 65 682 0166 **T** +353 66 719 0000
F +353 65 682 1234 **F** +353 66 719 0070
Shannon Development, Shannon Development,
Tipperary Technology Park, Birr Technology Centre,
Thurles, Co. Tipperary. Mill Road, Birr, Co. Offaly.
T +353 67 32 100 **T** +353 504 204 40
F +353 67 33 418 **F** +353 504 206 60
NATIONALDEVELOPMENTPLAN
T +353 504 293 00
F +353 504 293 05

Marketplace Networks & Linkages
Through InnovationWorks Limerick, Shannon Development offers client companies access to a range of marketplace networks and linkages for both new and growing companies including Shannon Development's and Enterprise Ireland's overseas offices, the E.B.N. network and the N.B.I.A.

Shannonsoft

Shannonsoft is a network for software activity in the Shannon Region and its objectives are to:

- Promote the Shannon Region's software industry's profile
- Build a critical mass of software-performing organisations in the Shannon Region
- Attract software professionals through the promotion of opportunities
- Foster the exchange of experiences between professionals
- Stimulate increased software-based business activities in the Shannon Region.

Shannon Supply Network

Supply Network Shannon represents engineering and electronics sub-supply companies in the Shannon Region and aims to reinforce the Region's position as a world-class source of sub-supply products and services.

Shannon Development Knowledge Network The Shannon Development Knowledge Network brings business, education and innovation together to create Ireland's most dynamic and exciting world-class locations for living and working in the knowledge age.

Each location within the Shannon Development Knowledge Network is dedicated to providing the resources and environment in which ideas and knowledge-based business are created, developed and succeed. There are currently five locations within the Shannon Development Knowledge Network.

Click on any of the five links below to view information on a specific location.

- Birr Technology Centre
- Information Age Park Ennis
- Kerry Technology Park Tralee
- National Technology Park Limerick

		• Tipperary Technology Park Thurles **InnovationWorks** Shannon Development has created InnovationWorks, state-of-the-art business incubation centres, to stimulate entrepreneurial potential and to develop a sustainable enterprise culture in the Shannon Region. The name InnovationWorks reflects the dynamic sense of innovation and energy created within these centres. InnovationWorks is helping entrepreneurs make the leap from business innovation to business success. Each InnovationWorks facility is located within a Shannon Development Knowledge Network location: • InnovationWorks Birr • InnovationWorks Ennis • InnovationWorks Limerick • InnovationWorks Tipperary • InnovationWorks Tralee A network of world-class locations for business and life. InnovationWorks has been designed to support new technology and knowledge-based businesses which are dedicated to exploiting the potential of new, fast-growing markets. InnovationWorks provides new businesses with a range of support services, including direct high-speed fibre optic telecommunications connections, giving InnovationWorks companies rapid access to the global marketplace. The facilities are designed to be ready-to-go, so that businesses can be up and running as quickly as possible — ready to exploit the full potential of the global economy. InnovationWorks facilities are housed within 'smart' buildings, individually designed around the needs of growing knowledge-age businesses. Clients have use of conference and meeting rooms as well as other resident business resources.
Tenant Firms		With over 80 organisations employing over 3,000 skilled people, occupying more than 30 buildings with a total floor area of circa 1.5 million sq.ft Source of country lists: **http://www.shannon-dev.ie/Business/Newsletters/** The current newsletter: http://www.shannon-dev.ie/Business/Documents/filename,2251,en.pdf NOTE: THis is also a good source of general information on the current status of the ICT base in Ireland – for general data collection, and the number of regional third level colleges etc… Look through all these newsletters to glean appropriate information…
Tenant Firm Profiles		Clarus, Cook Ireland, Digifone, Dell, Flextronics International, Worldcom, Modus Media, NETg Learning, Orygen, ComputerPREP, QAD, Sumicem and Vistakon (Johnson & Johnson).
Assessment of Success or		This park is considered successful because it is highly diversified in terms of inherent industry sector representation.

Failure		
KSFs or KFFs		Factors contributing to the success level of the park include: ➢ Public Policy ➢ Large scale government support – IDA support to US companies – low cost incentives and high quality services to sustain investment. ➢ Availability of an abundance of "specialized" technical labor ➢ Abundance of incubation and other business support services. ➢ High collaboration, networking, linkages and diversification. ➢ High gov. investment in education fostered rapid economic growth (thriving tech. sector) ➢ High-tech company successes resulting from 'center of excellence' qualities ➢ Entrepreneurial culture ➢ Favorable Public Policy - Low government hindering intervention ➢ High regional governmental and education support. ➢ High diversity of industry sector representation (not a core concentrated region) Shares common success factors for European tech parks are: ▪ Accessibility of the region ▪ Markets that are located nearby ▪ Incentives and aid offered to companies ▪ The national/regional regulations for FDI ▪ Large pool of technical talent ▪ Availability of preexisting infrastructure ▪ Access to top educational facilities and research institutions ▪ Access to well-developed business networks ▪ Access to finance ***Success factors in Europe based on economic factors*** Good research paper/info on the NTP: http://www.ul.ie/~idc/library/papersreports/LiamBannon/31/IFIP86.htm

A1.3.7 National Digital Park, Ireland

1		PROFILE INFORMATION
Common Name of Technology Park		National Digital Park
Location		Dublin, Ireland
Contact info.		**Developers** Davy Hickey Properties 27 Dawson Street Dublin 2 Tel. (+ 353 1) 679 5222 Fax. (+ 353 1) 679 6377 Email. info@davyhickey.ie **Agent** Jones Lang LaSalle 10/11 Molesworth Street Dublin 2 Tel. (+ 353 1) 673 1600 Fax. (+ 353 1) 679 5147 Email. info.ie@eu.joneslanglasalle.com If you would like someone to contact you or if you would like to request a brochure or sales call please fill in the Contact Form.
Formal park Name		National Digital Park, Dublin (CityWest Business Park)
Primary Focus		Digital Technology Innovation Digital media With its designation by the Irish government as Ireland's National Digital Park, Citywest stands ready to welcome further occupiers who share its passion -
Principal Owner/Investor		**Davy Hickey Properties** J & E Davy, Ireland's largest stockbrokers and a subsidiary of Bank of Ireland, came together with Brendan Hickey, the present Chairman and Managing Director of Davy Hickey Properties, to found that company in 1990. DHP is involved in a number of property development projects, however the principal one is Citywest Business Campus, Ireland's first and largest Business Park. Citywest is a mixed use Campus over 200 h.a. in extent and is the home to 125 hi-tech companies. It is also the location of the National Digital Park, a joint venture with the IDA, the Irish Government's National Development Agency and it is now to be the home of Eeolas, a joint venture between DCU and Citywest. For more information: www.citywest.ie The National Digital Park is a joint venture between the Irish Government's industrial promotional agency, the IDA and

		Citywest
Background		**eCommerce Campus:** Ireland opened its first high-tech eCommerce campus opened on July 5th, 1999. The 100-acre National Digital Park at the Citywest Business Campus in County Shannon became the new hub for high-tech communications and electronic commerce companies in Europe. The National Digital Park is a joint venture between IDA Ireland and Citywest Business Campus. The Irish Government recommended the establishment of a Digital Park in its report "Information Society Ireland: A strategy for Action" published in March 1997. The government's intervention and unique landscaping of the Campus has made it a success with over 50 companies employing 1,700 people located there, including high-tech and multinational companies such as Nortel, Xilinx, TDK, Rhone-Poulenc Rorer, Viking, Tuchenhagen, Saturn, Merck, Act Manufacturing, Iomega, Rand Technologies, JD Edwards and Netscape. Eircom is developing its flagship Business Service Center at Citywest, which will be geared to the needs of the company's top 5,000 corporate customers. [http://www.ida.ie/ebusiness/latest_news.asp] **National Digital Park** The National Digital Park is a joint venture between the Irish Government's industrial promotional agency, the IDA and Citywest to provide world class telecommunications infrastructure for companies requiring international broadband connectivity. Direct international connectivity with virtually unlimited bandwidth is available to all occupiers in the National Digital Park. Riverwalk is a major office development at the heart of the National Digital Park. It will provide an urban thoroughfare flanked by distinctive office buildings with a river running down the centre of the street and opening with wiers to a central piazza. Riverwalk will provide a genuine city centre atmosphere with a range of amenities for all who work there including a mini-market, banking facilities, sandwich shop and a bar/restaurant.
Vision		Over a decade ago, Davy Hickey Properties, the developers of Citywest set out to create one of the most desirable locations for global investment. Today, with its designation by the Irish government as Ireland's National Digital Park, Citywest stands ready to welcome further occupiers who share its passion -

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Vision of EOLAS Institute:

Eeolas is a strategic national initiative initiated through a joint venture between Dublin City University and Citywest Business Campus to help transform the academic & enterprise relationship in Ireland

Here are some online videos about this park:

Citywest – Past & Present:
http://www.citywest.com/video/high_wm/cw_pp.htm

National Digital Park:
http://www.citywest.com/video/high_wm/ndp.htm
Riverwalk:
http://www.citywest.com/video/high_wm/riverwalk.htm

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<tr>
<td>Mission</td>
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To create a global centre of excellence.

To provide world class telecommunications infrastructure for companies requiring international broadband connectivity.

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<td>Location</td>
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Citywest is conveniently located adjacent to the N7, with access via a grade separated interchange, just two miles from the M50 orbital motorway and a thirty minute drive from the airport or city centre.

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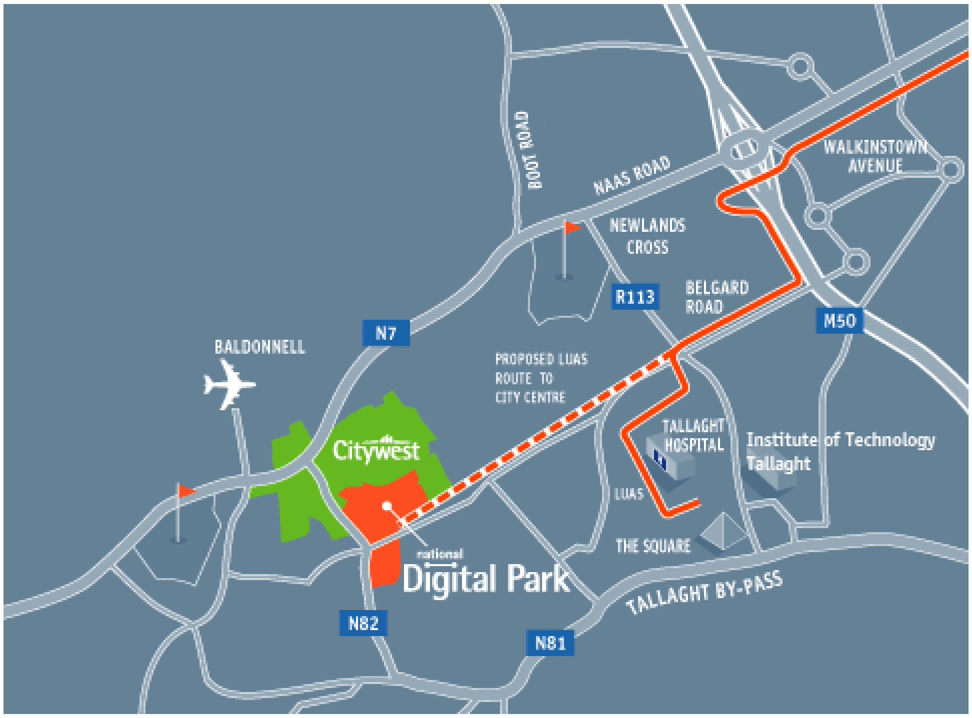


Access by Car
Citywest is conveniently located adjacent to the N7, with access via a grade separated interchange, just two miles from the M50 orbital motorway and a thirty minute drive from the airport or city centre.

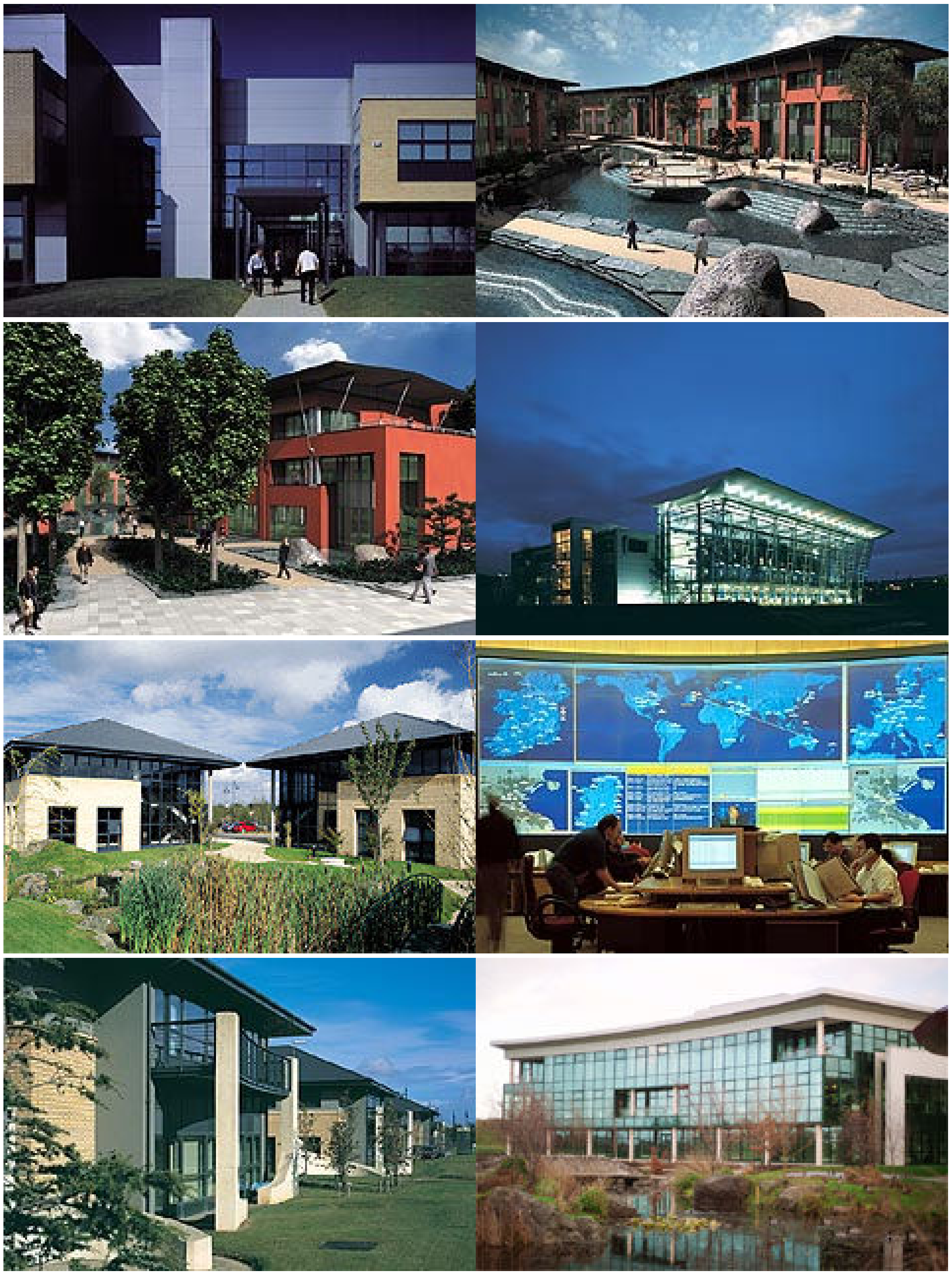
The N82 runs through the campus linking the N7 to the N81 serving Tallaght a major

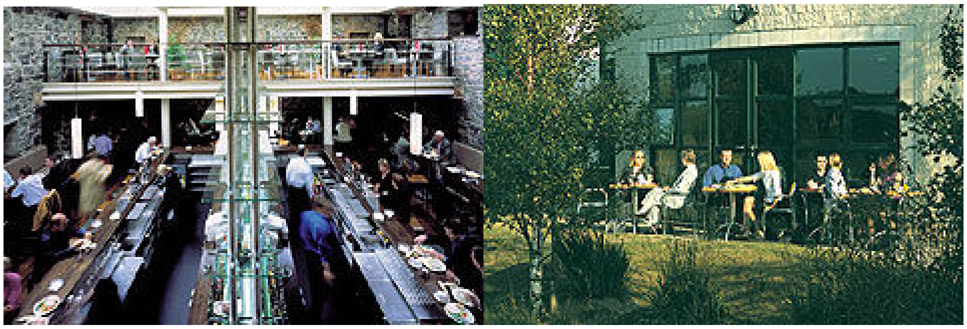
		suburb of the city. Occupiers enjoy generous car parking allocations. **Public Transport** Public transport is excellent with three Dublin Bus routes(50, 65B & 69) serving the campus from the city centre approximately every fifteen minutes. In addition the campus is served by another three Dublin Bus feeder services to Tallaght Town Centre (a major public transport hub) and other suburbs. The Luas light rail system serves Tallaght initially and ultimately Citywest. **Private Transport** Citywest operates a private express bus service to the city centre, suburban areas and the Luas in the morning and evening as an alternative transport option. **CITYWEST - AS A LOCATION** The quality of the landscaping and facilities at Citywest already provide a sense of community for the 80 companies, which have located there from nine different countries around the world. Citywest Business Campus is a managed and mature campus of over 300 acres, located just 30 minutes drive from the City Centre and Dublin International Airport. Davy Hickey Properties, the developers of Citywest are committed to faciltating the on-going development of the Eeolas Institute and to providing additional lands for same.
Facilities		**The setting** - a park like managed and secure campus surrounded by lifestyle amenities, providing a highly-attractive place to work and to live **The infrastructure** - state-of-the-art communications links, bringing the entire world within easy reach, both physically and electronically. Today, with its designation by the Irish government as Ireland's National Digital Park, Citywest stands ready to welcome further occupiers who share its passion to create a global centre of excellence. Online video explaining the parks infrastructure: http://www.citywest.com/video/high_wm/infrastructure.htm Citywest boasts all the amenities required of a world class business location either on-campus or in the immediate vicinity. There is a choice of restaurants, coffee shops, shops, service statiom, ATM facilities and Child Care Centre on-site. Nearby there are a range of restaurants, hotels, golf clubs and a host of other recreational facilities. Housing to suit all income levels is also locally available. The "Square" Shopping Centre in Tallaght together with Europe's largest training hospital and a third level College are just a few minutes drive from campus. **Direct international connectivity** with virtually unlimited bandwidth is available to all

occupiers in the National Digital Park.

Riverwalk is a major office development at the heart of the National Digital Park. It will provide **an urban thoroughfare flanked by distinctive office buildings** with a river running down the centre of the street and opening with wiers to a central piazza.

Riverwalk will provide a genuine city centre atmosphere with a range of amenities for all who work there including a mini-market, **banking facilities, sandwich shop and a bar/restaurant.**





Services

THROUG THE ASSOCIATED EOLAS UNIVERISITY RESEARCH CAMPUS:

Corporate Research
The campus already has one of Irelands more significant corporate research facilities, with Xilinx having their world class research and European Headquarters. Xilinx is a leader in the design and production of highly complex semiconductor chips, with a recent Euro 52 million expansion to its R&D design centre.
For more information: www.xilinx.ie

Collaborative Research
The various research groups within Dublin City University, and others across the Irish university and the Institutes of Technology are open to collaborative research of all sizes, with a range of partners. In terms of the Eeolas Research Campus and its primary partner university Dublin City University, we are particularly interested in research areas such as:

- Telecommunications technology and software, including wireless and mobile developments
- Enterprise & Internet Software; including dependable systems, database management, security and encryption
- Semiconductor Research

For further information on DCU research strengths: http://www.dcu.ie/research.shtml
For further information on research strengths in the colleges in the Dublin region: www.ict.ie

echnology Transfer
As development of collaborative research begins, both DCU and the other partners involved will aim to produce patents and company start-up activities. The Eeolas Institute encourages the active participation of partners in the technology transfer process.

NEWSLETTER SERVICE:

The Eeolas Institute will be launching a new email newsletter starting in May 2004. This newsletter will feature a selection of news, articles and information on the Eeolas Research Campus and relevant news from our partners.

To avail of this news service when it starts please email us at info@dcu.eeolas.ie. This will automatically register you and your email address will be added to our list .

Venture Capital
Venture Capital is the life blood of commercialisation and the technology transfer process. Currently the Eeolas Research Campus has the presence of two venture capital firms:

- Growcorp: Early stage funding, support and incubation facilities for ICT and lifesciences start-ups
- Crucible Venture Capital: Early stage investor that invests in start-ups primarily targeting the US market

INCUBATION:
http://www.startingabusinessinireland.com/dirgrowcorp.htm

www.startingabusinessinireland.com
information, advice & resources for entrepreneurs
TheSuccessStore
Not just a book.

Assistance

GROWCORP INNOVATION CENTRE

3015 Lake Drive, Citywest Business Campus Park, Dublin 24

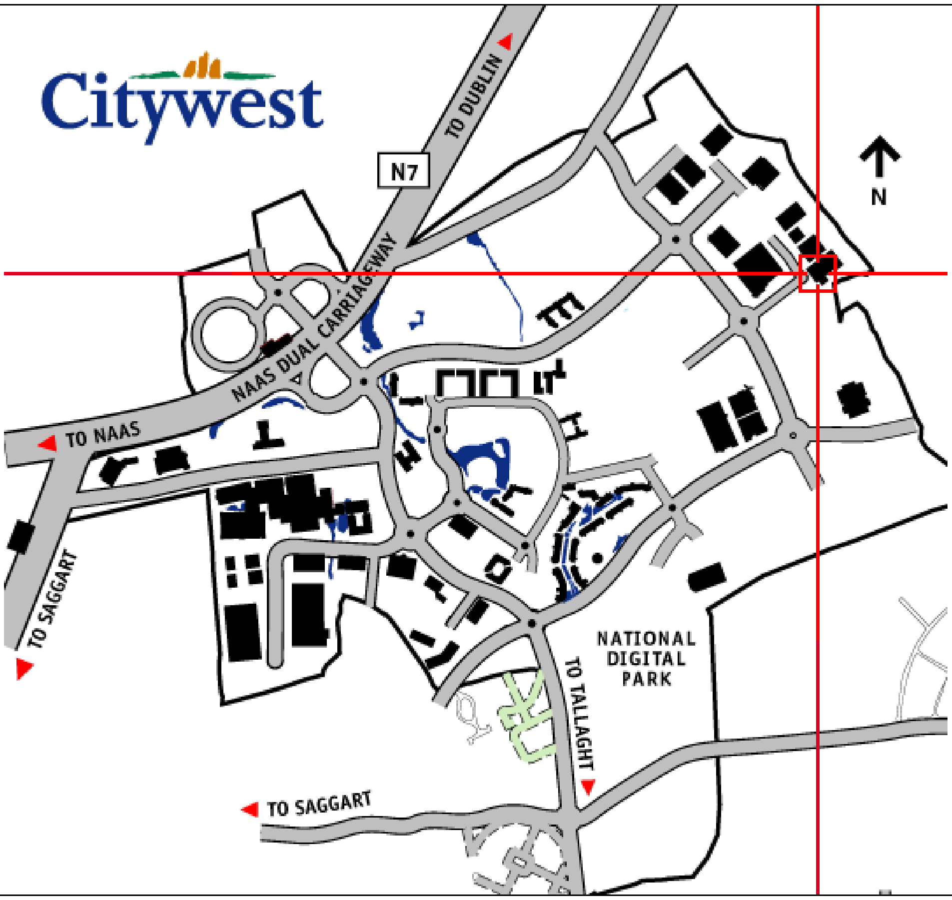
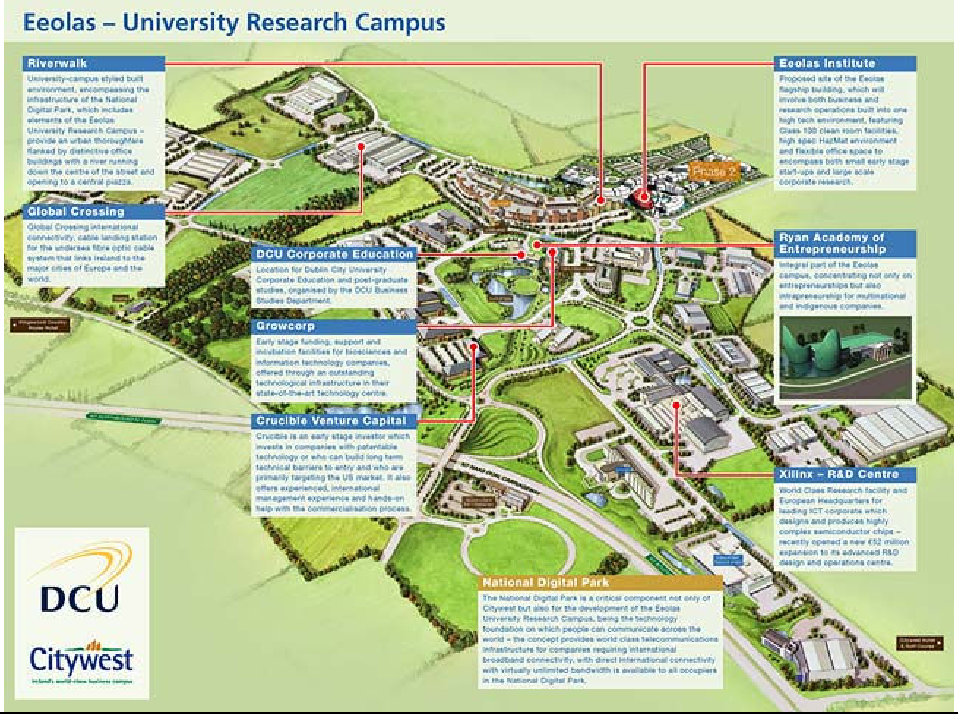
T: (01) 466 1000
F: (01) 466 1002
E: grow@growcorp.net
W: www.growcorp.net

Categories: Equity; Incubator

Growcorp develops businesses with leading-edge platform technologies in ICT and biosciences, through an incubation process that delivers the resources to ensure success in the global marketplace.

Growcorp has a 16,000 square feet state-of-the-art incubation facility in the National Digital Park at Citywest, Dublin.

It also manages the European Bioscience Fund.

Map of Tech Park		
Principal Technologies in Tech park		Software, ICT, Digital Technology/Media
Availability of Human Capital		 **Eeolas – University Research Campus** **Riverwalk** University-campus styled built environment, encompassing the infrastructure of the National Digital Park, which includes elements of the Eeolas University Research Campus – provide an urban thoroughfare flanked by distinctive office buildings with a river running down the centre of the street and opening to a central piazza. **Global Crossing** Global Crossing international connectivity, cable landing station for the undersea fibre optic cable system that links Ireland to the major cities of Europe and the world. **DCU Corporate Education** Location for Dublin City University Corporate Education and post-graduate studies, organised by the DCU Business Studies Department. **Growcorp** Early stage funding, support and incubation facilities for biosciences and information technology companies, offered through an outstanding technological infrastructure in their state-of-the-art technology centre. **Crucible Venture Capital** Crucible is an early stage investor which invests in companies with patentable technology or who can build long term technical barriers to entry and who are primarily targeting the US market. It also offers experienced, international management experience and hands-on help with the commercialisation process. **Eeolas Institute** Proposed site of the Eeolas flagship building, which will involve both business and research operations built into one high tech environment, featuring Class 100 clean room facilities, high spec HazMat environment and flexible office space to encompass both small early stage start-ups and large scale corporate research. **Ryan Academy of Entrepreneurship** Integral part of the Eeolas campus, concentrating not only on entrepreneurships but also intrapreneurship for multinational and indigenous companies. **Xilinx – R&D Centre** World Class Research facility and European Headquarters for leading ICT corporate which designs and produces highly complex semiconductor chips – recently opened a new €52 million expansion to its advanced R&D design and operations centre. **National Digital Park** The National Digital Park is a critical component not only of Citywest but also for the development of the Eeolas University Research Campus, being the technology foundation on which people can communicate across the world – the concept provides world class telecommunications infrastructure for companies requiring international broadband connectivity, with direct international connectivity with virtually unlimited bandwidth is available to all occupiers in the National Digital Park.

Dublin City University

Dublin City University was initially set up to fulfil the national requirement for a highly-trained workforce with skills in the areas of business, science and electronics, computer technology, communications and languages and as an agent for change in its local community. The first students came through the door in 1980 and the university is now recognised nationally and internationally as a centre of academic excellence.

It was awarded university status in 1989 and was considered at the time to be an 'unconventional' university. It broke with the traditional mould and introduced a number of ideas, which had enormous impact on the Irish education system. DCU was the first university in Ireland to introduce work placement (INTRA) as part of its degree programmes. The aim is for students to put their academic skills into practice in the work environment. Its degree programmes were also the first to be interdisciplinary, with, for example science students taking business courses, business students taking languages and language students taking computing. Many DCU students study at universities in Spain, France, Germany and Austria as part of their degree programmes under Erasmus exchange agreements.

For more information: www.dcu.ie

EEOLAS RESEARCH CAMPUS:

3013 Lake Drive Citywest Business Campus D24 | tel: +353 1 7005769 | fax: +353 1 700 5888
http://www.eeolas.dcu.ie/

Eeolas is a strategic national initiative initiated through a joint venture between Dublin City University and Citywest Business Campus to help transform the academic & enterprise relationship in Ireland

Eeolas will be positioned as a leading European Innovation & Research development with a mission to improve:

- Research collaboration between academia and Industry; not just with DCU but in time with other third level and research institutions in Ireland
- Entrepreneurship and intrapreneurship skills within the high-tech sector (i.e. both high-technology start-ups as well as multinational technology companies)
- Technology transfer from Irish universities into industry, and across industries

Research excellence in specific high technology industries - targeting the best ICT research in Ireland and marrying it with the best in international corporate research

By developing an academic & research campus within the Citywest campus, the Eeolas Research Campus will act as a focal point for the development of corporate research & development on the campus, and to aid the development of a hitech industry cluster along the M50 roadway which runs around Dublin City.

Ryan Academy:

The first major physical development of the Eeolas Research Campus is the Ryan Academy of Entrepreneurship, which is about to be built in Citywest and will be a key component of the management development element of the campus.

"a resource for creating and sustaining enterprise development though championing the position and perception of the entrepreneur in society"

The Ryan Academy for Entrepreneurship will be a world class resource for developing both the quality and quantity of entrepreneurial capability in Ireland, through needs-based innovative training and education programmes.

The establishment of the academy is being facilitated by gifts from the family of Dr. T.A. Ryan, founder of Guinness Peat Aviation (GPA) and Ryanair. Today the airline is one of the World's most successful short haul carriers in the world.

The Academy will be housed in an architecturally distinctive purpose-built building at Citywest
distinguishing it from other entrepreneurial training locations within colleges and universities by moving it closer to the "real world".

The Academy is the first major physical development of the Eeolas Research Campus. Eeolas is a joint venture between Dublin City University and Citywest, designed to transform academic and enterprise relationships in Ireland.

Features:

- It will be a centre of excellence in teaching and researching entrepreneurship
- It will act as an advocate for entrepreneurs, intrapreneurs and enterprise education.
- Access to world class personnel and state of the art thinking on entrepreneurship;
- Integration of existing entrepreneurs into the academy's teaching and learning activities;
- Peer networking to support and disseminate best practice;
- An emphasis on transforming people as creative, innovative leaders.
- An ethos dedicated to creativity, efficiency and quality of delivery.

Availability of Finance and Investment Capital

VENTURE CAPITAL

http://wired.com/wired/archive/8.07/silicon.html?pg=11
- site lists venture capital firms in lots of cities/locations

W ON NEWSSTANDS NOW
Issue 8.07 | July 2000

Government programs and incentives - including new technical colleges, upgrades in communications infrastructure, and rock-bottom corporate tax rates - have been so successful in attracting high tech manufacturing (Dell, Gateway, Intel, Microsoft) and fostering the growth of telecom and financial services industries that Ireland is now one of Europe's most impressive economic success stories. Driven by Dublin plus pockets of activity in the west and southwest, Ireland has surpassed the US as the number-one software exporter, has the fourth-highest GDP per capita in the EU, and enjoys one of the union's lowest unemployment rates (5 percent). The government is now promoting

		"eir-commerce," deregulating telecoms to encourage ISP competition, campaigning to get the Irish online, and helping to finance broadband infrastructure. Dublin now hosts the 100-acre National Digital Park, which aims to become a major European ecommerce hub. While Dublin has its share of IT success stories (including Baltimore Technologies, the first homegrown ebusiness to be listed on Nasdaq), the city knows it still has its work cut out for it. At an Internet World Ireland conference last fall, Ireland's minister for public enterprise, Mary O'Rourke, warned the audience: "If you don't do your business on the Net, you'll be sidelined." **Universities and research:3** **Established companies:3** **Startups:3** **Venture capital:3**
Resources and Incentives		**Digital Specification** **International Connectivity** Irish point of presence for transatlantic fibre. Direct fibre link to 24 cities in Europe, US, South America and Asia Pacific. **Bandwidth Capacity** IP Network with bandwidth of 297 Gb/per second. **Telecommunication Providers** Choice of 5 providers with connectivity to their Dublin and International fibre loops. Chosen location for Eircom's Network Management Centre. **Building Services** 20 way ducting serving all Riverwalk buildings. **Resilience/Redundancy** All ducting to individual Riverwalk buildings and around campus in resilient loops. **Data Centres** Chosen location of data centres for Eircom, BT, Telecity and Metromedia Fiber Networks. **Electrical Power** Campus located on National Grid.
Regional Production System Linkages		EOLAS Institute Dublin City University.
Tenant Firms		**The players** - home to over 150 companies with a global reach, focused on innovation, at the cutting edge of new technologies Citywest has attracted over 80 companies from 9 different nationalities. International companies seeking to benefit from attractive corporation tax rates and the availability of a skilled and educated workforce, have chosen Citywest as their European headquarters or as a global

launching pad.

High profile Irish companies have also recognised that Citywest is a world class location.

TENANT COMPANIES (153):

Abbott Laboratories
AC Nielsen
Adobe Systems
Alcatel
All Water Systems
Allied Irish Bank
Alma Communications
ALTANA Pharma
America On Line (A.O.L.)
Associated Hardware
ATC
Bache Treharne
Beaver Distribution
Biovail Technologies (Ireland) Ltd.
Bridge Street Deli
Bright Horizons Child Care Centre
Brown's Barn
BSM
Build On Line
Carr Engineering Supplies Ltd
Cassidy Wines
Castle of Ireland
Celtic Anglian Water
Chiroxia
Citywest Limited
Colgate Palmolive
Contours Express
Control Equipment
CreVinn Teoranta
CUDA
Davy Hickey Properties
DoveBid
Earth Tech (Irl) Ltd.
Econnect
Eicon Technology
Eircom Hosting Services
Eircom Network Management
Enable Integrated Solutions
ESAT/BT

		Eurocommerce Evans Shop Equipment Executive Edge Recruitment F.D.S. Technology Systems Fahy Fitzpatrick FKM Group Forest Hill Financial Planning Frontline Communications G E. Interlogix Glanbia Globalvoice Networks Ground Force Growcorp Handle IT Honda Universal Honeywill & Stein HSB Haughton Insurance Iaasa Impress Digital Independent Communications Independent Directory Independent Newspapers Plc Interactive Enterprise Irish Pneumatic Services Ltd Irish Times Limited iTouch Ireland KAL Keller Ground Engineering Kerry Connect Kerry Ingredients KIT Know How Media Laing O'Rourke Lake View Cafe M.J. Flood Matrix Merck Meteor Mobile Communications Meteor Mobile Communications Micro Fidelio Ireland MicroFocus MobileAware Ltd Moravia IT National Car Testing Nestlé Net Team nEutekbio

		Newsconnected **NewTel Communications** **Nice CTI Systems** **Nortel Network (Dublin) Ltd** **Nova Science** **NTR** **O'Brien Ingredients** **Oce Ireland Limited** **Odaios Foods** **Odenberg Engineering Ltd** **Orbital Skid Technology** **Ouncel Process Consultants Ltd** **Panasonic Ireland Ltd** **PeopleSoft** **Pfizer** **Pharmatrim** **Pigsback.com** **Plantronics Ltd.** **Premier Business Centre** **Premier Fleet Management** **Prosalis** **PTC** **Quest Software** **R.M.I.** **Rand Technologies** **Realm Communications** **Rits** **Roche** **Rockbrook Engineering** **Rockwool** **Ryan Academy** **Sage Software** **Sanofi Aventis** **Sanyo Air Conditioners Ireland** **SAP** **Security Plus** **Shire Pharmaceuticals** **Shop Equipment Limited** **siliconrepublic.com** **Smart Telecom Plc** **SMC Pneumatics Ireland Ltd** **SNAP Printing** **Softonomy** **South Western Area Health Board** **Spar Newsagents** **Specialist Payroll** **Specialist Security Services**

Spectrum Print Management Ltd
Spicers Ireland
Statoil
T.D.K. Electronics
Tack International Training
Telecity Limited
The Sheehan Group
Time & Data Systems
Topsec Technology Limited
Transition Ireland
Unilever
Unison.ie
United Drug
Viking Components Europe
Walsh Group
Ward Consulting
Wincor Nixdorf
Xilinx
YKK (UK) Limited
York ARC Limited

Tenant Firm Profiles

Abbott Laboratories
4051 Kingswood Drive
http://www.abbott.ie

Tel. + 353 1 4691500
Fax. + 353 1 4691501
Email. majellamceneaney@abbott.com

AC Nielsen
14 Riverwalk, National Digital Park
http://www.acnielsen.com

Tel. +353 1 4690400
Fax. +353 1 4690500
Email. valery.mcsherry@ie.acnielsen.com

Adobe Systems
3100 Lake Drive,
http://www.adobe.com

Tel. +353 1 4336700
Fax. +353 1 4336711
Email. amcguinn@adobe.com

Alcatel
3013 Lake Drive
http://alcatel.com

Tel. +353 1 4690600
Fax. + 353 1 4690601
Email. kirsty.macdonald@alcatel.ie

All Water Systems
2018 Orchard Avenue

Tel.	+353 1 4660133
Fax.	+353 1 4660134
URL.	http://www.aws-water.com
Email.	coolers@aws.com

Allied Irish Bank
3090 Lake Drive

Tel.	+353 1 4038600
Fax.	+353 1 4660482
URL.	http://www.aib.ie
Email	moire.c.barry@aib.ie

Alma Communications
3013 Premier Business Group

Tel.	+35314693711

ALTANA Pharma
2051 Castle Drive

Tel.	+35316420021
Fax.	+35314692001

America On Line (A.O.L.)
3040 Lake Drive

Tel.	+353 1 4692000
Fax.	+353 1 4692001
URL.	http://www.aol.com
Email.	johnberginIRL@aol.com

Associated Hardware
20 Magna Drive

Tel.	+35314611800
Fax.	+35314573801

ATC
2059 Castle Drive

Tel.	+353 1 4035710
Fax.	+353 1 4035711
URL.	http://www.atc-logistics.ie
Email	info@atc-logistics.ie

Bache Treharne
3013 Premier Business Group

Tel. +35314693712

Beaver Distribution
22 Magna Drive

Tel.
URL. www.beaverdistribution.ie

Biovail Technologies (Ireland) Ltd.
3200 Lake Drive

Tel. +353 1 4660900
Fax. +353 1 4660901
URL. http://www.biovail.com

Bridge Street Deli
8 Riverwalk

Tel. +35314661147
Fax. +35314661148

Bright Horizons Child Care Centre
4008-4010 Kingswood, Dublin 24

Tel. +353 1 4035717
Fax. +353 1 8853948
URL. http://www.brighthorizons.com

Brown's Barn
Citywest Bridge

Tel. +353 1 4640930
Fax. +353 1 4640929
URL. http://www.brownsbarn.ie

BSM
3015 Lake Drive

Tel.

Build On Line
3015 Lake Drive

Tel.

Carr Engineering Supplies Ltd
2056 Castle Drive

Tel.	+353 1 4663010
Fax.	+353 1 4663011

Cassidy Wines
18 Magna Drive N.D.P

Tel.	+35314135500
Fax.	+35314529120

Castle of Ireland
2001 Citywest Road

Tel.	+353 1 4660363
Fax.	+353 1 4660375
URL.	http://www.castleknitwear.com

Celtic Anglian Water
12 Riverwalk

Tel.	+ 353 1 4691290
Fax.	+ 353 1 4691291

Chiroxia
3015 Lake Drive

Tel.

Citywest Limited
3013 Lake Drive

Tel.	+353 1 4660160
Fax.	+353 1 4660170
URL.	http://www.citywest.ie

Colgate Palmolive
3054 Lake Drive

Tel.	+353 1 4039800
Fax.	+353 1 4039801
URL.	http://colgate.com

Contours Express
3013 Premier Business Group

Tel.	+35314693710

Control Equipment
4056 Kingswood Drive

Tel.	+353 1 4660577
Fax.	+353 1 4660563
URL.	http://cedl.ie

CreVinn Teoranta
3013 Premier Business Group

Tel.	+35314693704

CUDA
3013 Premier Business Centre

Tel.	+ 353 1 4693715

Davy Hickey Properties
3013 Lake Drive

Tel.	+353 1 4660160
Fax.	+353 1 4660170
URL.	http://www.citywest.ie

DoveBid
4044 Kingswood Avenue

Tel.	+35314660389
Fax.	+35314660391

Earth Tech (Irl) Ltd.
4054 Kingswood Drive

Tel.	4039300
Fax.	4039301

Econnect
3013 Lake Drive

Tel.	+35314693375
Fax.	+35314693115

Eicon Technology
4034 Kingswood Avenue

Tel.	+353 1 6309000
Fax.	+353 1 6309099

Eircom Hosting Services
4050 Kingswood Avenue

Tel.	+353 1 7010704
Fax.	+353 1 7010707
URL.	http://www.eircom.net

Eircom Network Management
2022 Bianconi Avenue

Tel.	+353 1 1800255255
Fax.	+353 1 1800233123
URL.	http://www.eircom.ie

Enable Integrated Solutions
3015 Lake Drive

Tel.

ESAT/BT
4029 Kingswood Road

Tel.	+353 1 4326900
Fax.	+353 1 4326988
URL.	http://www.esat.com

Eurocommerce
3015 Lake Drive

Tel.

Evans Shop Equipment
4052 Kingswood Avenue

Tel. +353 1 4035380
Fax. +353 1 40355301
URL. http://www.hevans.ie

Executive Edge Recruitment
2017 Orchard Avenue

Tel. +353 1 4663983
Fax. +353 1 4663985
URL. http://www.executiveedge.ie

F.D.S. Technology Systems
3013 Lake Drive

Tel.

Fahy Fitzpatrick
2057 Castle Drive

Tel. +353 1 4660566
Fax. +353 1 4660567
URL. http://www.fahyfitz.com

FKM Group
14 River Walk, National Digital Park

Tel. +353 1 4145000
Fax. +353 1 4145005
URL. www.fkm.com

Forest Hill Financial Planning
3013 Premier Business Centre

Tel. + 353 1 4693716

Frontline Communications
2051 Citywest Rd (Cluster)

Tel. +353 1 4035736
Fax. +353 1 4660527

G E. Interlogix
2007-2008 Orchard Avenue

Tel.	+353 1 4699600
Fax.	+353 1 4699687
URL.	www.ge-interlogix.com

Glanbia
3008 Lake Drive

Tel.	+35314881000
URL.	www.glanbia.ie

Globalvoice Networks
4035 Citywest Avenue

Tel.	+353 1 4691000
Fax.	+353 1 4691001
URL.	http://www.globalvoice.ie

Ground Force
15 Magna Drive

Tel.

Growcorp
3015 Lake Drive

Tel.	+353 1 4661000
Fax.	+353 1 4661002
URL.	http://www.growcorp.net

Handle IT
3015 Lake Drive

Tel.	+ 353 1 5006200
Fax.	+ 353 1 5006238

Honda Universal
302 Brownsbarn Drive

Tel.

Honeywill & Stein
3013 Lake Drive

Tel.

HSB Haughton Insurance
3013 Lake Drive

Tel.

Iaasa
3013 Lake Drive

Tel. + 353 1 4693702

Impress Digital
3050 Lake Drive

Tel.

Independent Communications
3050 Lake Drive

Tel. +353 1 4112000
Fax. +353 1 4112001
URL. http://www.unison.ie

Independent Directory
3050 Lake Drive

Tel.

Independent Newspapers Plc
2023 Bianconi Avenue

Tel. +353 1 4663200
Fax. +353 1 4663222
URL. http://www.unison.ie/irish_independent/

Interactive Enterprise
7 Riverwalk, National Digital Park

Tel.	+353 1 4491900
Fax.	+353 1 4491901
URL.	http://www.interactive-enterprise.com/index.shtml

Irish Pneumatic Services Ltd
2014 Orchard Avenue

Tel.	+353 1 4660200
Fax.	+353 1 4660158
URL.	http://www.irishpneumatic.com

Irish Times Limited
4080 Kingswood Road

Tel.	+353 1 6758100
Fax.	+353 1 6758111
URL.	http://www.ireland.com

iTouch Ireland
3050 Lake Drive

Tel.	

KAL
4078 Kingswood Drive

Tel.	+3531413 6400
Fax.	+3531413 6464

Keller Ground Engineering
3013 Premier Business Group

Tel.	+35314693709

Kerry Connect
3013 Lake Drive

Tel.

Kerry Ingredients
3013 Lake Drive

Tel.

KIT
13 Magna Drive

Tel.	+353 1 404 9444
Fax.	+353 1 404 9443

Know How Media
3050 Lake Drive

Tel.

Laing O'Rourke
3050 Lake Drive

Tel.	+ 353 1 4640308
Fax.	+ 353 1 4640307

Lake View Cafe
3015 Lake Drive

Tel.	+353 1 4660338
Fax.	+353 1 5006209

M.J. Flood
2024 Bianconi Avenue

Tel.	+353 1 4663500
Fax.	+353 1 4660051
URL.	http://mjflood.ie

Matrix
3013 Lake Drive

Tel.

Merck
3013 Lake Drive

Tel.	+353 1 4661900
Fax.	+353 1 4661902

Meteor Mobile Communications
4030 Kingswood Avenue

Tel.	+353 1 4307000
Fax.	+353 1 4307010
URL.	http://meteor.ie

Meteor Mobile Communications
14 Riverwalk, National Digital Park

Tel.	+353 1 4307000
Fax.	+353 1 4307016
URL.	http://meteor.ie

Micro Fidelio Ireland
3013 Lake Drive

Tel.

MicroFocus
3013 Lake Drive

Tel.

MobileAware Ltd
3094 Lake Drive

Tel.	+353 1 2410500
Fax.	+353 1 2410501
URL.	http://www.mobileaware.com

Moravia IT
3013 Lake Drive

Tel.

National Car Testing
3026 Lake Drive

Tel.	+353 1 4135900
Fax.	+353 1 4135982
URL.	http://www.nct.ie

Nestlé
3030 Lake Drive

Tel.	+353 1 4497777
Fax.	+353 1 4497778
URL.	http://www.nestle.com

Net Team
3015 Lake Drive

Tel.

nEutekbio
3015 Lake Drive

Tel.

Newsconnected
2051 Citywest Road

Tel.	4038150
Fax.	4660524

NewTel Communications
3006 Lake Drive

Tel.	+ 353 1 4661000
Fax.	+ 353 1 4661002

Nice CTI Systems
3013 Lake Drive

Tel.

Nortel Network (Dublin) Ltd
3002 Lake Drive

Tel.	+353 1 4035555
Fax.	+353 1 4035500

Nova Science
3010 Lake Drive

Tel.	+353 1 4035460
Fax.	+353 1 4035488
URL.	http://www.nova-science.ie

NTR
12 Riverwalk

Tel.	+ 353 1 4691200
Fax.	+ 353 1 4691201

O'Brien Ingredients
11 Magna Drive

Tel.	+35314691400
Fax.	+35314691360

Oce Ireland Limited
3006 Lake Drive

Tel.	+353 1 4039100
Fax.	+353 1 4039110
URL.	http://oce.com

Odaios Foods
11 Magna Drive

Tel.	+35314691400
Fax.	+35314691360

Odenberg Engineering Ltd
2005 Orchard Avenue

Tel.	+353 1 4136200
Fax.	+353 1 4571325
URL.	http://odenberg.com

Orbital Skid Technology
3013 Premier Business Group

Tel.	+35314693717

Ouncel Process Consultants Ltd
3013 Premier Business Group

Tel.	+35314693724

Panasonic Ireland Ltd
3013 Lake Drive

Tel.	+353 1 4135300
Fax.	+353 1 4660252
URL.	http://www.panasonic.co.uk

PeopleSoft
3018 Lake Drive

Tel.	+353 1 4039200
Fax.	+353 1 4039220
URL.	http://www.peoplesoft.com

Pfizer
9 Riverwalk

Tel.	+35314676500
Fax.	+35314676501
URL.	www.pfizer.ie

Pharmatrim
3015 Lake Drive

Tel.	+ 353 1 246 9000

Pigsback.com
3016 Lake Drive

Tel. +353 1 2431900
Fax. +353 1 4038210
URL. http://www.pigsback.com

Plantronics Ltd.
3013 Lake Drive

Tel. +35314693725

Premier Business Centre
3013 Lake Drive

Tel. +353 1 4693100
Fax. +353 1 4693115
URL. http://premgroup.com

Premier Fleet Management
3013 Premier Business Group

Tel. +35314693733

Prosalis
3015 Lake Drive

Tel.

PTC
3016 Lake Drive

Tel. +353 1 4035822
Fax. +353 1 4660113
URL. http://www.ptc.com

Quest Software
3013 Premier Business Centre

Tel. + 353 1 4693704

R.M.I.
2055 Castle Drive

Tel.	+353 1 4038700
Fax.	+353 1 4660426
URL.	http://www.rmi.ie

Rand Technologies
3016 Lake Drive

Tel.	+353 1 4035800
Fax.	+353 1 4035899
URL.	http://www.rand.com

Realm Communications
2055 Castle Drive

Tel.	+353 1 4661166
Fax.	+353 1 4660933

Rits
2052 Castle Drive

Tel.	+353 1 6420500
Fax.	+353 1 4660468
URL.	http://www.rits.ie

Roche
3004 Lake Drive

Tel.	+353 1 4690700
Fax.	+353 1 4690790
URL.	http://www.roche.ie

Rockbrook Engineering
3015 Lake Drive

Tel.

Rockwool
3015 Lake Drive

Tel.

Ryan Academy
3013 Lake Drive

Tel. +353 1 700 5000
URL. www.dcu.ie

Sage Software
3093 Lake Drive

Tel. +353 1 6420800
Fax. +353 1 6420899
URL. http://www.sage.com

Sanofi Aventis
18 Riverwalk, National Digital Park

Tel. +353 1 4035600
Fax. +353 1 4035602
URL. http://www.aventis.ie

Sanyo Air Conditioners Ireland
8 Riverwalk

Tel. +35314039900
Fax. +35314039931

SAP
1012-1014 Kingswood Avenue

Tel. +353 1 4690000
Fax. +353 1 4690100
URL. http://www.sap.com

Security Plus
2013 Orchard Avenue

Tel. + 353 1 7077 200
Fax. + 353 1 7077 201
URL. http://www.splus.ie

Shire Pharmaceuticals
5 Riverwalk

Tel.

Shop Equipment Limited
4052 Kingswood Drive

Tel.	+353 1 4035300
Fax.	+353 1 4035301
URL.	http://hevans.ie

siliconrepublic.com
2051 Citywest Road

Tel.	+353 1 4038175
Fax.	+353 1 4660524
URL.	http://www.siliconrepublic.com

Smart Telecom Plc
3300 Lake Drive

Tel.	+353 1 4699300
Fax.	+353 1 4699301
URL.	http://www.smarttelecom.ie

SMC Pneumatics Ireland Ltd
2002 Citywest Road

Tel.	+353 1 4039000
Fax.	+353 1 4640500
URL.	http://www.smcpneumatic.ie

SNAP Printing
2058 Castle Drive

Tel.	+353 1 4660525
Fax.	+353 1 4660554
URL.	http://citywest.snapprinting.ie

Softonomy
3015 Lake Drive

Tel.

South Western Area Health Board
4044 Kingswood Avenue

Tel.

Spar Newsagents
8 Riverwalk N.D.P.

Tel.	+353 14135872
Fax.	+353 1 4663955
URL.	http://www.spar.ie

Specialist Payroll
3015 Lake Drive

Tel.

Specialist Security Services
8 Riverwalk NDP

Tel.	+ 353 1 626 0269
Fax.	+ 353 1 623 4781
URL.	http://www.specialistsecurity.ie

Spectrum Print Management Ltd
4044 Kingswood Avenue

Tel.	+353 1 4039600
Fax.	+353 1 4039650
URL.	http://www.spectrum.ie

Spicers Ireland
4058 Kingswood Drive

Tel.	+353 1 2457800
Fax.	+353 1 2457815
URL.	http://www.spicers.net

Statoil
Browns Barn Drive

Tel.	+35314034708
URL.	www.statoil.ie

T.D.K. Electronics
3022 Lake Drive

Tel. +353 1 4133200
Fax. +353 1 4133295
URL. http://www.tdk.de

Tack International Training
3015 Lake Drive

Tel.

Telecity Limited
4027 Kingswood Road

Tel. +353 1 4332000
Fax. +353 1 4332001
URL. http://www.telecity.ie

The Sheehan Group
3013 Lake Drive

Tel.

Time & Data Systems
2060 Castle Drive

Tel. +353 1 4663060
Fax. +353 1 4663070
URL. http://www.tds.ie

Topsec Technology Limited
2012 Orchard Avenue

Tel. +353 1 4660686
Fax. +353 1 4660687
URL. http://www.topsectechnology.com

Transition Ireland
2053 Castle Drive

Tel. +3535 1 4660101
Fax. +353 1 4660103
URL. http://www.transitionireland.ie

Unilever
20 Riverwalk

Tel. +35312914000
Fax. +35312984397
URL. www.unilever.ie

Unison.ie
3050 Lake Drive

Tel.

United Drug
10 Magna Drive

Tel. +35314632300
Fax. +35314632333

Viking Components Europe
3013 Lake Drive

Tel. +353 1 4660090
Fax. +353 1 4660120
URL. http://www.vikingcomponents.com

Walsh Group
2004 Orchard Avenue

Tel. +353 1 4039401
Fax. +353 1 4660441
URL. http://www.walshautomation.com/anglais/homea/home.

Ward Consulting
2054 Castle Drive

Tel. +353 1 6420100
Fax. +353 1 6420161
URL. http://www.ward.ie

Wincor Nixdorf
2015 Orchard Avenue

Tel. +353 1 4660960

		Xilinx 2020 Bianconi Avenue **Tel.** +353 1 4640311 **Fax.** +353 1 4640324 **URL.** http://www.xilinx.com **Search Results** **YKK (UK) Limited** 2011 Orchard Avenue **Tel.** +353 1 4660060 **Fax.** +353 1 4660070 **URL.** http://www.ykkeurope.com **York ARC Limited** 2004 Orchard Avenue **Tel.** +353 1 4660177 **Fax.** +353 1 4660198 **URL.** http://www.york.com
Assessment of Success or Failure		Somewhat successful due to support from large anchor firm investment in the park, and through significant investment by the Industrial Development Association (IDA), Ireland.
KSFs or KFFs		Factors contributing the success level of the park… ➢ Public Policy ➢ Large scale government support – IDA support to US companies – low cost incentives and high quality services to sustain investment. ➢ Availability of labor ➢ Low to medium collaboration, networking, linkages ➢ Low diversification – focus in digital applications, media and innovation ➢ Limited incubation and business services support. ➢ Niched focus on digital innovation makes this park a candidate for concentration of technical resources which generallt limits growth and success (although this is not always true). ➢ There is an relatively good entrepreneurial culture in Ireland. ➢ Medium gov. investment development within the thriving high-tech sector ➢ Some company successes – not yet an established 'center of excellence'.

		Plus this park shares the following other success factors for European tech parks area: ▪ Accessibility of the region ▪ The national/regional regulations for FDI ▪ Availability of preexisting infrastructure ▪ Access to top educational facilities and research institutions ▪ Access to finance ***Success factors in Europe based on economic factors***

A1.3.8 Alba Technology Center, Scotland

1		PROFILE INFORMATION
Common Name of Technology Park		Alba Technology Center
Location		West Lothian, Scotland Capital of Scotland's Silicon Glen Location: 14 miles west of Edinburgh Population: 50,000 Average house price in 2000: £63,177 Over 60% of homes are owner occupied Working population: 24,000 25% of West Lothian residents work in Livingston Over 7 million sq ft of factory floor space Largest Employers: SKY, Jabil Circuits, Intelligent Finance, Quintiles
Phone		Tel: 01506 407000 (if dialing from the UK) or your international access code, then 44 (the UK country code) and 1506 407000 To make inquiries about the conference facilities, contact the Institute for System Level Integration at the Alba Centre on 01506 469300.
Email address		enquiries@albacentre.co.uk
Formal park Name		Alba Technology Center, The Alba Campus
Address		 For further information please contact: The Alba Centre, Alba Campus Livingston, West Lothian EH54 7EG Scotland, Tel: +44 (0)1506 407000 Fax: +44 (0)1506 407001 e-mail: enquiries@albacentre.co.uk Web site: www.scottish-enterprise.com/albacentre
Fax		Fax: 01506 407001 (if dialing from the UK) or your international access code, then 44 (the UK country code)and 1506 407 001
Primary Focus		Microelectronics. Electronics design research System on Chip and System Level Integration
Principal Owner/Investor		The Alba Centre demonstrates how government, industry and academia can collaborate to create a world-leading centre. The Alba Centre grew out of an initiative by Scottish Enterprise to develop Scotland as a leading world location for "system level integration" technology.

		Working in partnership with four of Scotland's top Universities in this field (Edinburgh, Heriot-Watt, Strathclyde and Glasgow) and a range of private sector partners both inside and outside Scotland, the vision has become reality.
Background		Edinburgh Science Triangle THE SCOTTISH PROPERTY AWARDS 2002 Commercial Development of the Year The Alba Centre is the hub of a Scottish initiative aimed at driving the future of electronic design. It represents a unique collaboration involving government, industry and academia to create a world-leading centre for the electronic and related design industries of the future The Alba Centre in Livingston, West Lothian, is at the centre of a Scottish Enterprise project to support the electronic design community. It is one of the agency's key microelectronics initiatives. Providing business accommodation and support, the centre was created in partnership with government, industry and academia to provide a world-class centre for the electronic and related design industries of the future. It is the result of a unique collaboration involving government, industry and academia to ensure Scotland`s position as a world-leading centre for the development, teaching and implementation of the methodologies necessary for this next generation of electronic design. The Alba Campus is being developed under a public-private sector joint venture agreement, named Alba Campus Ltd. This joint partnership includes Scottish Enterprise Edinburgh and Lothian, Miller Developments and the Bank of Scotland (Miller BoS). Located on a landscaped 96 acre site, in the heart of Scotland's Silicon Glen, it offers companies in the knowledge-based electronic design industries the ideal working environment.
Vision		**The Partnership** The development of Alba Campus is being driven forward by an innovative public-private sector partnership involving government, industry and academia led by Scottish Enterprise Edinburgh and Lothian and Miller Group/Bank of Scotland. Scotland is establishing a worldwide reputation as a prime location for the global electronic design industry. Alba Campus is central to this. A major focus therefore is on the availability of an outstanding choice of accommodation in a highly attractive location. In our determination to ensure that Alba Campus is the location of choice for the next generation of electronics entrepreneurs, we have created an integrated environment that is designed to meet every conceivable need of incoming companies and organisations.

A JOINT VENTURE BETWEEN

BANK OF SCOTLAND

miller

Scottish Enterprise Edinburgh and Lothian

Mission

To provide business accommodation and support.

To be a world-class centre for the electronic and related design industries of the future

"Scotland now has a worldwide reputation for excellence in the field of electronic design, thanks largely to the Alba Centre."

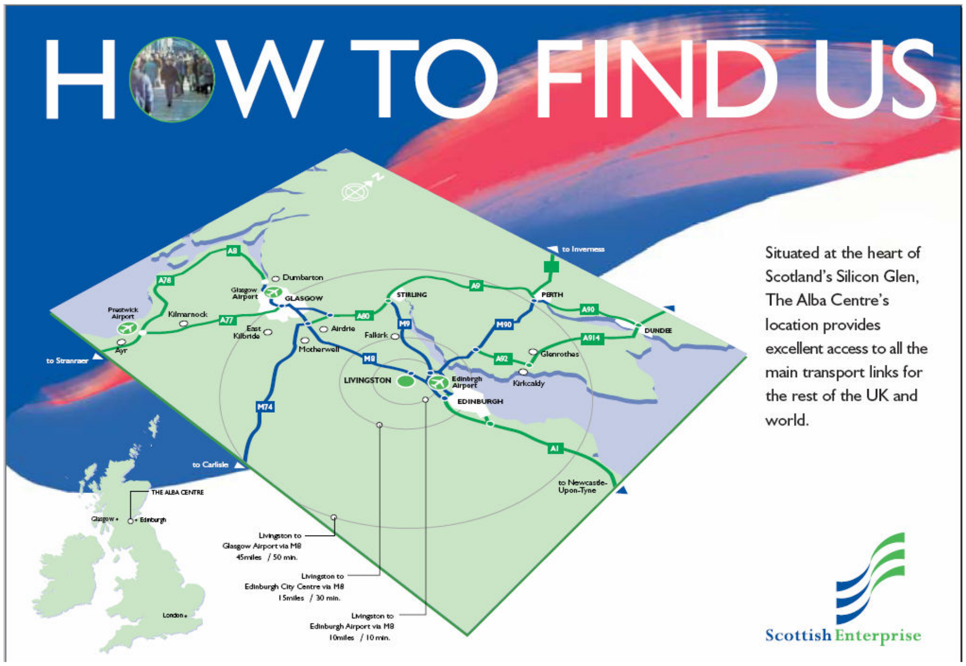
The Alba Campus in Livingston has been created to meet the exacting demands of tomorrow's design industry and education sectors.

This initiative, launched in December 1997, has at its heart the mission to develop Scotland as a leading world centre of microelectronic product design and technology. Since its inception the industry in Scotland has doubled, helped by investments from companies such as Cadence Design Systems, Motorola, Virtio, Test Advantage and Epson, as well as indigenous growth from companies such as IndigoVision, Axeon, 4i2i and Nallatech.

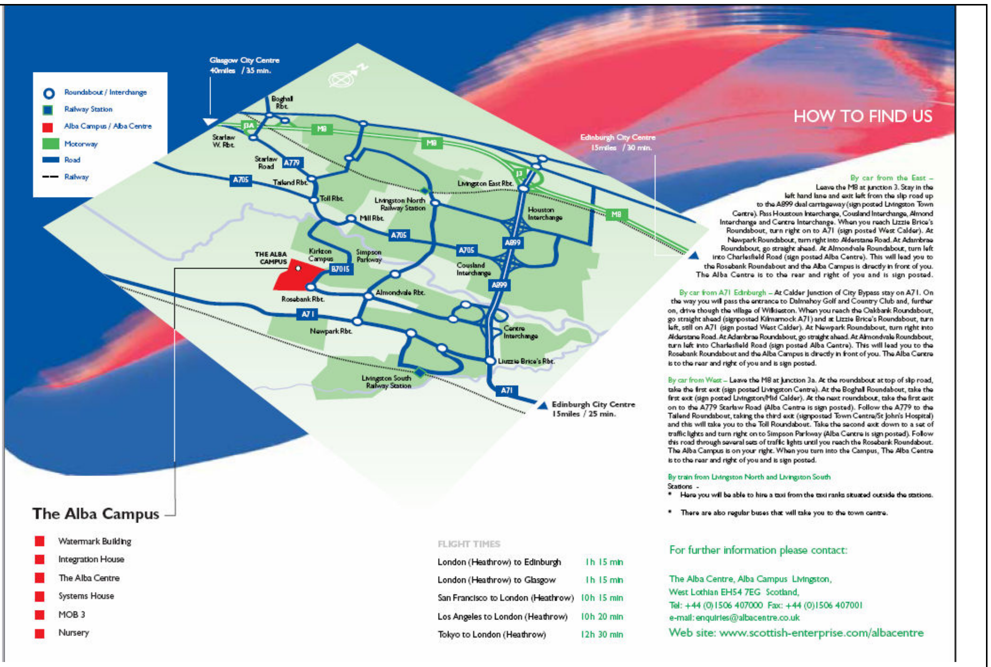
To focus is on System on Chip and System Level Integration to place Scotland at the forefront of shaping the global electronic design industry.

Location

West Lothian, Scotland



Situated at the heart of Scotland's Silicon Glen, The Alba Centre's location provides excellent access to all the main transport links for the rest of the UK and world.



HOW TO FIND US

By car from the East – Leave the M8 at junction 3. Stay in the left hand lane and exit left from the slip road up to the A899 dual carriageway (sign posted Livingston Town Centre). Pass Houstoun Interchange, Cousland Interchange, Almond Interchange and Centre Interchange. When you reach Lizzie Brice's Roundabout, turn right on to A71 (sign posted West Calder). At Newpark Roundabout, turn right into Alderstane Road. At Adambrae Roundabout, go straight ahead. At Almondvale Roundabout, turn left into Charlesfield Road (sign posted Alba Centre). This will lead you to the Rosebank Roundabout and the Alba Campus is directly in front of you. The Alba Centre is to the rear and right of you and is sign posted.

By car from A71 Edinburgh – At Calder Junction of City Bypass stay on A71. On the way you will pass the entrance to Dalmahoy Golf and Country Club and, further on, drive though the village of Wilkieston. When you reach the Oakbank Roundabout, go straight ahead (signposted Kilmarnock A71) and at Lizzie Brice's Roundabout, turn left, still on A71 (sign posted West Calder). At Newpark Roundabout, turn right into Alderstane Road. At Adambrae Roundabout, go straight ahead. At Almondvale Roundabout, turn left into Charlesfield Road (sign posted Alba Centre). This will lead you to the Rosebank Roundabout and the Alba Campus is directly in front of you. The Alba Centre is to the rear and right of you and is sign posted.

By car from West – Leave the M8 at Junction 3a. At the roundabout at top of slip road, take the first exit (sign posted Livingston Centre). At the Boghall Roundabout, take the first exit (sign posted Livingston/Mid Calder). At the next roundabout, take the first exit on to the A779 Starlaw Road (Alba Centre is sign posted). Follow the A779 to the Tailend Roundabout, taking the third exit (signposted Town Centre/St John's Hospital) and this will take you to the Toll Roundabout. Take the second exit down to a set of traffic lights and turn right on to Simpson Parkway (Alba Centre is sign posted). Follow this road through several sets of traffic lights until you reach the Rosebank Roundabout. The Alba Campus is on your right. When you turn into the Campus, The Alba Centre is to the rear and right of you and is sign posted.

By train from Livingston North and Livingston South
Stations -

- Here you will be able to hire a taxi from the taxi ranks situated outside the stations.
- There are also regular buses that will take you to the town centre.

The Alba Campus

- 🟥 Watermark Building
- 🟥 Integration House
- 🟥 The Alba Centre
- 🟥 Systems House
- 🟥 MOB 3
- 🟥 Nursery

FLIGHT TIMES

London (Heathrow) to Edinburgh	1h 15 min
London (Heathrow) to Glasgow	1h 15 min
San Francisco to London (Heathrow)	10h 15 min
Los Angeles to London (Heathrow)	10h 20 min
Tokyo to London (Heathrow)	12h 30 min

For further information please contact:

The Alba Centre, Alba Campus Livingston,
West Lothian EH54 7EG Scotland,
Tel: +44 (0)1506 407000 Fax: +44 (0)1506 407001
e-mail: enquiries@albacentre.co.uk
Web site: www.scottish-enterprise.com/albacentre

GETTING THERE:

By air:The Alba Campus is conveniently located close to two major airports and connecting motorways. Edinburgh airport is a 20-minute drive and Glasgow airport 1 hour and 15 minutes.

Flight Times

- London (Heathrow) to Edinburgh 1 h 15 min
- London (Heathrow) to Glasgow 1 h 15 min
- San Francisco to London (Heathrow) 10 h 15 min
- Los Angeles to London (Heathrow) 10 h 20 min
- Tokyo to London (Heathrow) 12 h 30 min

By car from the east: Leave the M8 at junction 3. From the left-hand lane take the slip road onto the A899 dual carriageway (sign posted Livingston Town Centre). From the A899 exit at the Cousland Interchange and turn left onto the A705 (sign posted Blackburn) for a further 1.5 miles until you reach the Mill Roundabout.

From the Mill Roundabout take the second exit (sign posted Kirkton Campus) onto the B7015 Simpson Parkway. Follow this road for about 1.5 miles. The Alba Centre is located on the right-hand side, off the Rosebank Roundabout on the Alba Campus.

By car from the west : Leave the M8 at junction 3A. At the roundabout at the top of the slip road take the first exit (sign posted Livingston Centre). At the next roundabout (Boghall) take the first exit (sign posted Livingston Centre/Mid Calder) crossing over the M8 motorway. At the next roundabout take the first exit onto the A779 Starlaw Road (sign posted Livingston Centre/Mid Calder).

Follow the A779 to the next roundabout (Tailend) taking the second exit (sign posted Town Centre/St John's Hospital) and continue along the A779 to the next roundabout (Toll). Take the second exit onto the A705 Cousland Road (sign posted Town Centre/Kirkton Campus). Proceed along the A705 for 1.5 miles until you reach the Mill Roundabout.

From the Mill Roundabout take the fourth exit (sign posted Kirkton Campus) onto the B7015 Simpson Parkway. Follow this road for about 1.5 miles. The Alba Centre is located on the right-hand side, off the Rosebank Roundabout, on the Alba Campus.

By train from Livingston North and Livingston South Stations: Here you will be able to hire a taxi from the taxi ranks situated outside the stations.

There are also regular buses that will take you to the town centre.

Facilities

Approximate travel times to the Alba Campus:

✈ 20 mins: Edinburgh Airport

✈ 60 mins: Glasgow Airport

⇄ 5 mins: Livingston train station

🚗 10 mins: Junction 3 of M8 motorway

🚗 30 mins: Edinburgh city centre

🚗 45 mins: Glasgow city centre

Meeting/Conference Rooms

Day Care Nursery

100 seater restaurant

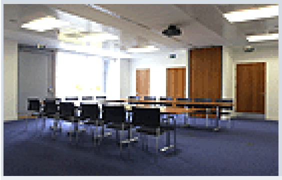
Adjacent fitness facilities

Coffee shop

24 Hour Security

Other facilities on Campus

Meeting/Conference Rooms



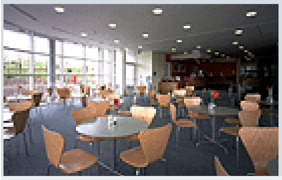
Coffee shop

Day Care Nursery

CARESHARE

Lecture Theatre

100 seater restaurant



Adjacent fitness facilities

The Facts

A unique collaboration between government, industry and academia

World leading centre for teaching and research

- 1.1 million sq ft development in Livingston
- Attractive landscaped 100 acre site
- Totally integrated environment for the electronic design sector
- Office accommodation to suit a range of needs
- On site test facilities
- Extremely convenient location
- Excellent transport links
- High quality staff amenities

Alba Campus

Work continues apace at Alba Campus - the 102,000 sq m / 1.1 million sq ft development in Scotland`s central belt, embodying the Alba Vision in a physical campus, aimed at creating a centre of excellence in electronic design. Developed by a joint venture between Scottish Enterprise Edinburgh and Lothian and Miller Developments/Bank of Scotland, Alba Campus will ultimately create around 5,000 high-quality, sustainable jobs in the areas of research and development, system-on-chip design and intellectual property. Integration House (2,576 sq m/27,729 sq ft) opened in May 2001 and is currently home to Motorola, Spektra Systems, Plexus and Epson. Systems House - a 3,251 sq m (35,000 sq ft) building recently completed, is available for occupation. The Alba Centre Building (3716 sq m /40,000 sq ft) is up and running at the hub of the campus offering shared facilities and resources. A full day care nursery for up to 95 children will be in place by the end of 2002.

The centre offers:

- a "quick-start" location for microelectronics firms and their design activities, either on the adjoining Alba Campus or elsewhere in Scotland;
- a choice of accommodation, from start-up suites, allowing immediate entry, to purpose-built properties;
- a dedicated centre of excellence for "system on chip" technology and design;
- help to anyone involved in embedded software development in Scotland, particularly small and medium sized companies, through the Scottish Embedded Software Centre;
- improved innovation through Alba's Institute for System Level Integration (ISLI) which offers training, research and technology related to Systems Level Integration; and
- conference facilities for hire through the Stewart Miller Conference Centre (part of the ISLI at Alba).

The centre can help microelectronics firms shorten the time they take to get new products to the markeplace. This package of support can also help you control resources more efficienty and improve your firm's success and potential for profit.

The Campus offers a choice of accommodation, from immediate entry start-up suits to purpose-built property, excellent travel links and supporting infrastructure.

Opportunities for Occupiers
Accommodation has been designed to meet the business needs of design professionals and businesses can choose from:

- Incubator units providing fully supported, immediate entry office space for design teams with shared facilities such as meeting rooms, full secretarial and administrative support, presentation suites and a restaurant

- Permanent office space for small to medium sized enterprises in purpose built multiple occupancy buildings

- Sites available for single users to have their own flagship buildings constructed in collaboration with the Alba Campus team
- Suites of between 1,123 sq m to 3,369 sq m now available with up to 149 car spaces.

Office Space Availability:

SYSTEMS HOUSE

- **256 SQ.M (2,755 SQ.FT) – 1,097 SQ.M (11,804 SQ.FT) AVAILABLE**
- **1ST & 2nd FLOORS LET TO BRITISH ENERGY**
- **GRADE A SPECIFICATION**

Systems House is the latest addition to
Alba Campus, Scotland's centre of excellence.
A modern, purpose built office, Systems House offers 3,369 sq m of accommodation arranged over 3 floors. The building is set in attractive, landscaped parkland a short distance from Livingston Town Centre and had excellent transport links. Staff have a wide choice of
on site amenities. Adjacent is a fully equipped
sports and leisure centre whilst excellent
shopping and the other attractions of a bustling
town centre are five minutes away.

At Systems House tenants enjoy the benefits
of high quality office accommodation in a central
location. The building has been designed to meet the requirements of high tech companies and is environmentally friendly and easy to maintain.

There is also instant access to a wealth of
support at The Alba Centre, home to The Virtual
Component Exchange, The Institute for System
Level Integration, The Test Technology Centre,
The Scottish Embedded Software Centre and
The Alba Centre Business Team.

ALBA CENTRE

- **SUITES FROM 113.8 sq.m (1,224 sq.ft) - 452.0 sq.m (4,864 sq.ft)**
- **FLEXIBLE LEASE TERMS**

SYSTEMS HOUSE – TO LET:
TO LET - SYSTEMS HOUSE: http://www.albacampus.com/Alba%20Campus.pdf

1st and 2nd Floors
Let to British Energy

- Generous parking provision
- Excellent on site amenities
- Established business park location

Competitive rental terms •

TO LET

SYSTEMS HOUSE

256 sq m (2,755 sq ft) – 1,097 sq m (11,808 sq ft)

THE ALBA CAMPUS:

SPECIFICATION

Large floor plates allowing for flexible space planning

Generous tiled reception area with full height glazed atrium

400mm full accessed raised floor

Fan coil heating and cooling system

Fibre optic links

Showers and separate male, female and disabled toilets

LG3 Category 2 recessed modular light fittings

Fully accessible suspended ceiling

Generous parking provision

LOCATION

Alba Campus is strategically located between Edinburgh and Glasgow and lies at the heart of the transport infrastructure with easy access to the National Motorway Network. Junction 3 of the M8 is a short distance away. Livingston North and South Railway Stations are in close proximity, & Edinburgh Airport is only a 15 minute drive away.

Alba Campus is located approximately one mile west of Livingston town centre. There are a number of regular bus routes servicing the town centre and nearby bus terminal and Livingston North Rail Station. Alba Campus is close to local amenities including the McArthur Glen shopping centre, Almondvale shopping centre and a fully equipped sports and leisure centre.

DESCRIPTION

Systems House is arranged over three floors and is set in attractive, landscaped parkland. There is a generous parking provision of 1:243 sq ft and high quality finishes throughout. British Energy currently occupy the first and second floors of Systems House. The Property also benefits from a manned reception at no extra cost to prospective tenants.

The premises to let comprise the entire ground floor of Systems House, arranged as two separate suites. The campus benefits from a number of on site facilities including a cafe in the Alba Centre, Bannatynes Health & Fitness Club and a children's nursery.

Other occupiers on Alba Campus include Epson, Motorola, Plexus and the Institute for System Level Integration.

QUOTING TERMS

The suites are available on flexible terms on a new full repairing and insuring lease.

RATEABLE VALUE

We have been verbally informed by West Lothian assessors that the rateable value of the whole of Systems House from 1st April 2005 will be RV £481,500 per annum. The commercial rate poundage from 1st April 2005 will be 46.1p, resulting in a rates liability of £6.12 per sq ft for the financial year 2005/2006.

VAT
All prices are quoted exclusive of VAT.

ACCOMMODATION

North Wing	605 SQ M	6,510 SQ FT
East Wing	492 SQ M	5,294 SQ FT
Total	1,097 SQ M	11,804 SQ FT

Real Estate Services/Management:

Cameron Stott
Tel: 0131 225 8344
www.joneslanglasalle.co.uk

Toby Withall
Tel: 0870 909 89 90
www.gvagrimley.co.uk

Anne McMunn
Tel: 0131 470 3400
http://www.countrywidepn.co.uk

Services

The main elements of the Alba Centre initiative are the Virtual Component Exchange, the Institute for System Level Integration and the development of the Alba Campus. These are complemented by: a microelectronics Test Technology Centre, in association with Test Advantage; the Scottish Embedded Software Centre; talentscotland.com, which focuses on careers, the Alba Associates programme to create a global network of engineers, and a project on convergent technologies in association with MMI Group

Alba Associates

In November 1999, The Alba Associates programme was launched to encourage companies and individuals from around the world to participate in some of the Alba Centre activities without necessarily having a physical presence on the Livingston campus.

"Although the Alba Centre and the majority of its activities are located physically in Scotland, we want to take a `global village` approach, encouraging worldwide participation in the thinking, research and implementation happening here. This will advance the state-of-the-art in electronic design everywhere," said Neil Francis, Director of the Alba Centre. "By establishing a wider network of communication, and involving more creative minds in our initiatives, Alba can make an even greater contribution as the epicentre - both physically and virtually – of SOC-related advancements."

Registration for the Alba Associates programme is free via "www.albacentre.com/associates". Members receive a password allowing access to the Associates-only area of the Alba Centre website.

The Virtual Component Exchange (www.thevcx.com)

In October 2000 the Virtual Component Exchange (VCX), an e-commerce organization with global electronics industry backing, announced the launch of the world`s first Internet-based, regulated trading exchange for semiconductor intellectual property (SIP, often called virtual components). The innovative, patent-pending B2B marketplace and services is located at www.thevcx.com, and has extensive links throughout the Internet to member and portal partner websites.

The launch of the exchange was the result of two year`s of industry input on a standard, efficient and safe way for companies to buy and sell the critical building blocks that comprise today`s complex silicon chips. On April 23, 2001, the VCX announced the first trade using its TransactionWare TM toolset for a contract worth several hundreds of thousands dollars by leading IP and design services supplier Tality Corp.

To develop the VCX infrastructure, Scottish Enterprise joined together with a wide range of industry players. These include: Mentor Graphics, Motorola, Toshiba, Amphion, ARM, Tality, TSMC, Arc Cores, OKI Electric, Silicon Integration Initiative, Spektra Systems, Synchronicity, UMC, Y Explorations Inc., Accent, Improv Systems, Inc, Mitsubishi Electric, Korean Electronics Institute (KETI), SIP Consortium in Taiwan, Sonics and Sony Corporation.

The VCX now has 50 member companies, including leading IP sellers, buyers, foundries and SoC design tool providers.

Institute for System Level Integration (www.sli-institute.ac.uk)

The Institute for System Level Integration (ISLI), a unique academic partnership of four distinguished Scottish Universities - Edinburgh, Glasgow, Heriot-Watt and Strathclyde, was established in October 1998 and formally constituted in December 1998. ISLI combines research and teaching strengths of the seven University Departments of Electrical/Electronic Engineering, Computing Science and Informatics. Its mission is to support the growth of systems design, SLI, SoC and related activities with world-class research, education and training programmes.

The Institute`s first educational programme, the MSc in SLI by Research, was launched in October 1998. Part-time MSc study commenced in January 1999. Full-time MSc and Engineering Doctorate programmes in System Level Integration were launched in October 1999. ISLI currently has over 80 students studying on a full-time or part-time basis. The Institute launched the world's first MSc in System Level Integration by distance learning in March 2002.

Convergent Technologies

In December 2001, Scottish Enterprise and Medical Marketing International plc (MMI) announced the formation of a partnership to establish a business incubator facility on the Alba Campus with the capacity to create around 500 jobs in markets worth more than $600 billion. A new subsidiary of MMI, Blaven Technologies, has been set up for the project, based initially at the Alba Centre.

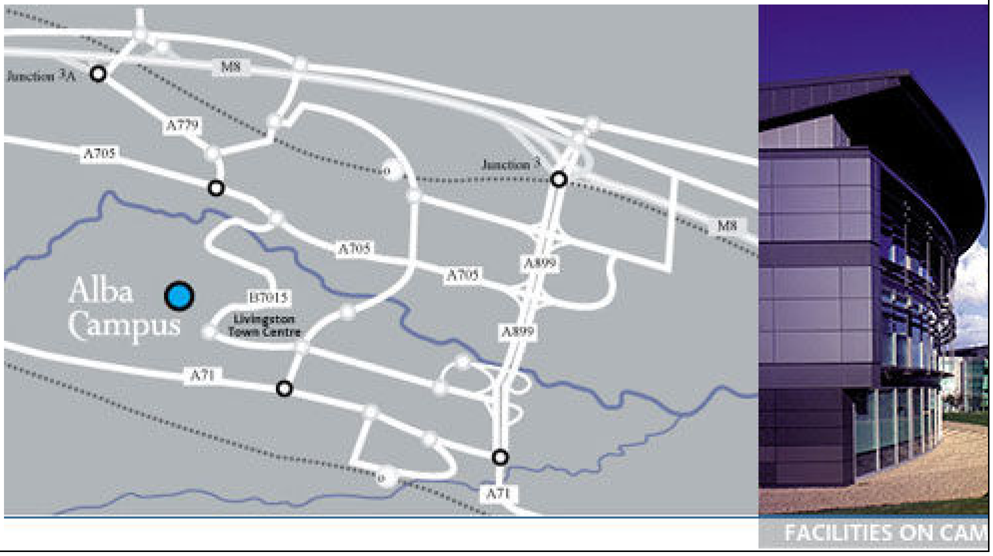
The new incubator will focus on the rapidly emerging area of nanotechnology as well as MMI's established business in biotechnology with a special emphasis on where these two sectors overlap. This “convergent technology” sector is seen by many in both the biotechnology and electronics industries as the way to develop the products of the future.

The team is working closely with Scottish universities and NHS trusts with the aim of commercialising research that brings together the strengths of the different disciplines such as biopharmaceutical and microelectronics. These projects will then be “mentored” by the Blaven Technologies team and “incubated” in purpose-built laboratory or clean room facilities with a view to growing technology companies of the future, which will be successful on a global scale. Depending on the numbers of companies incubated, the project has the capacity to create more than 500 jobs.

Links

Electronics Scotland - www.electronics-scotland.com - website of the industry body representing the electronics sector in Scotland.

Scotland IS Scottish Software Federation - www.scotsoft.org.uk - website of Scotland IS, the organisation representing, promoting and serving internet,

		software and multimedia business in Scotland. ScottishElectonics.com - www.scottishelectronics.com - a database of companies working in the electronics manufacturing sector in Scotland. Scottish Optoelectronics Association - www.optoelectronics.org.uk - the organisation representing the optoelectronics community in Scotland. Scottish Embedded Software Centre http://www.embedded-software.org.uk
Map of Tech Park		

		
Principal Technologies in Tech park		Microelectronics, Electronic design and research. System on Chip and System Level Integration
Availability of Human Capital		Many regional education centers, including the Glasgow Universities and several Universities in Edinburgh. The onsite System Level Integration center – with many linked undergraduate and masters and PhD level programs in Microelectronics leading to employment in the centers and onsite in the park.
Tenant Firms		CURRENT TENANT FIRMS: Scotland's microelectronics industry has doubled in size thanks to investments by current occupiers of Alba Campus such as: **Cadence** Cadence is the largest supplier of electronic design technologies, methodology services, and design services. Cadence solutions are used to accelerate and manage the design of semiconductors, computer systems, networking and telecommunications equipment, consumer electronics, and a variety of other electronics-based products. cādence **Motorola** A global leader in integrated communications and embedded electronic solutions for customers in networking and computing, transportation, wireless communications and digital consumer/home networking. MOTOROLA **Epson** Produces high-quality environmentally friendly products based on precision processing and colour imaging technologies. Currently developing a new generation of energy saving EPSON

products with increased technical abilities

Virtio
Creator of Internet virtual prototyping platforms - delivering an environment where embedded systems are evaluated, customised and proliferated.

The Institute for System Level Integration
A collaboration between the Universities of Edinburgh, Glasgow, Heriot-Watt and Strathclyde to provide outstanding facilities for research, training and education including the world's first Masters and Doctorate programmes in System Level Integration

The Alba Centre
The Alba Centre Business Team - a committed professional team of business advisors who understand the complex issues of semiconductor design

Careshare Nurseries
With a total of 17 nurseries Careshare is Scotlands leading childcare provider. Careshare opened its first nursery in August 1990 and has a total registration of just over 1000 children. The new nursery at Alba Campus will provide care for up to 100 children with the ability to expand as the Campus develops.

Plexus
Headquarters in Neenah, Wisconsin, Plexus provides product realisation services to original equipment manufacturers (OEM's)in the networking, datacommunications, medical, industrial, commercial and computer electronics industries. Plexus offers engineering and product development, new product introduction (NPI), prototyping, material procurement and management, assembly, testing, manufacturing complex final system assembly, fulfilment and sustaining services.

See also the information in separate documents for:
THE INSTITUTE FOR SYSTEM LEVEL INTEGRATION
SCOTTISH EMBEDDED SOFTWARE CENTER

These are also comprised in the ALBA TECHNOLOGY CENTER AREA

TESTIMONIALS:

> Alba Campus is a prime location for Virtio in terms of talent, location and infrastructure. In particular industry initiatives such as The Institute for System Level Integration enable us to leverage a pool of engineering talent that is rich in embedded system expertise
>
> Shay Ben-Chorin, Virtio President and CEO

> This latest development is significant to Careshare as it not only brings us closer to our target of 22 nurseries by summer 2002 but it takes us back to the town where we launched Scotland's first purpose-built nursery just over 10 years ago. Our philosophy is to deliver a professional childcare service that meets the needs of the children, their parents and our staff. The facilities on Alba Campus are already excellent and our new state-of-the-art nursery will complement the range of services available to the tenants there
>
> Isabel Ridley, Founder and Managing Director, Careshare

CARESHARE

> We are delighted to be able to increase our links with the Alba Centre, ISLI and VCX Ltd. Alba was a key factor in our decision to bring Motorola's embedded software project to Scotland and we are keen to continue to expand this relationship
>
> Michael Kay, Motorola

MOTOROLA

> Plexus decision to locate a Design Centre in Scotland was driven not only by the availability of highly skilled and motivated staff but also the great quality of lifestyle Scotland offers. We were also attracted by the opportunity to join a growing Electronic Design Community in Scotland and the benefits of proximity to leading academic institutions
>
> Mike Eccles, Plexus

PLEXUS®
The Product Realization Company

Tenant Firm Profiles

Alba Inward Investments

The Alba Centre has welcomed a number of companies who have set up design operations in Scotland, some on the Alba Campus and others further afield, but all firmly linked in to the operations at Alba. Since September 2000 companies such as Epson, Virtio, Test Advantage, and Motorola have all announced the establishment of operations at Alba. They join a growing community of companies involved in electronic design, including the first Alba tenant Cadence Design Systems.

A number of companies have already chosen to locate on the Alba Campus including Epson Scotland Design Centre and Spektra Systems.

News – July 2002

Plexus Technology group announced that it has established a new conceptual design facility on the Alba Campus. The new operation will employ eight senior electronics and software engineers specialising in the medical, computing and industrial equipment markets.

Assessment of Success or Failure		Considered less successful mainly because this parks niche focus on the microelectronics does not allow for diversification into a wide range of industry sectors.
KSFs or KFFs		Factors contributing to the hindrance of this parks success. some of which are common to the European Union are: ▪ Low diversification and industry linkages ▪ Limited entrepreneurial culture ▪ Conservative finance capital ▪ Concentration of technological resources in a core region ▪ Limited incentives and aid offered to companies ▪ Limited access to well-developed business networks ▪ Limited access to supporting finance. Factors contributing the success level of the park, some of which are shared with the EU region: ▪ High integration/collaboration with universities/research ▪ Accessibility of the region ▪ Markets that are located nearby ▪ Availability of pre-existing infrastructure ▪ Access to top educational facilities and research institutions ***Success factors in Europe based on economic factors***

A1.3.9 Edinburgh Technopole, Scotland

1		PROFILE INFORMATION
Common Name of Technology Park		**Edinburgh Technopole Park**
Location		Edinburgh, United Kingdom
Phone		+44 (0)131 440 3510
Email address		ian@edinburghtechnopole.co.uk (Ian Murphy - Director)
Formal park Name		The Technopole
Address Line		The Technopole Centre Bush Estate EH26 0PJ
Primary Focus		Science and Technology
Background		The Technopole is part of The Edinburgh Science Triangle, a federation of local science parks and associated manufacturing parks that gain synergy by working together for the betterment of the science community in Edinburgh and Lothians. Other members include Heriot-Watt Research Park, BioCampus, Roslin BioCentre and Pentland Science Park. It has a total of 83 tenants with 4,100 employees on 252k m^2 of build, putting it in the top 20 largest science parks in the world.
Vision		The Technopole aims to become not just a Science and Technology Park but a genuine scientific community where shared resources encourage shared ideas, engendering cross-fertilisation between different disciplines and synergy between different projects.
Mission		Edinburgh Technopole is aiming to create an optimised environment and infrastructure designed to stimulate the growth of organisations using technology, particularly those with the potential for interaction with the University of Edinburgh.
Location		Edinburgh Technopole is located to the south of the City of Edinburgh, Scotland's capital city and one of the UK's fastest growing economies. In addition to being a major centre for research through its three Universities and numerous research establishments, it also offers an exceptional quality of life, and is attractive to a highly educated work force.

Facilities

Accommodation

Accommodation	500,000 sq ft (46,450 sq m)
Gross internal area	500,000 sq ft (46,450 sq m)

Services

FLEXIBLE OCCUPANCY

Edinburgh Technopole is the ideal environment for companies which evolve and grow rapidly, providing:

- Small office and laboratory suites on flexible leases and all-inclusive cost packages, readily responding to growth.
- Highly specified office and laboratory suites within multi tenanted buildings, capable of accommodating maturing companies.
- Self contained buildings from 25,000 sq.ft. (2,323 sq.m.) designed to provide property solutions for larger companies.
- Bespoke buildings developed quickly to suit specific requirements.
- An ongoing development programme ensuring space availability at all times.

Edinburgh Technopole is able to meet the needs of the largest occupiers, but also recognises the issues faced by new dynamic companies experiencing rapid growth.

Traditional property approaches are often incompatible with rapid growth, and therefore Edinburgh Technopole offers solutions.

By providing smaller units of high quality space on flexible leases, along with larger buildings and built-to-suit solutions, companies can enjoy the ability to move on as space requirements grow.

ON-SITE AMENITIES

Edinburgh Technopole is master-planned as a very low density development in a mature parkland setting. It is designed to conserve the landscaping of the original country estate, to produce a tranquil and attractive working environment. In addition to the ongoing programme of development, there are a wide range of opportunities for specific buildings to be tailored to occupier requirements. Principal features include:

- High level broadband provision
- Central amenities hub based in Bush House
- Facilities management options
- A fully managed landscaped environment
- CCTV security
- An intranet, providing information and services for park occupiers
- Shared facilities with Pentlands Science Park

Bush House provides a focus for amenities, and is being converted to provide:

- Small office suites
- Meeting rooms for hire
- Café / bar
- Park manager's office

Future developments will follow to meet demand, including:

- Nursery
- Conference space
- Residential rooms
- Health & fitness

Access is available to selected facilities at neighbouring Pentland Science Park, including:

- Refectory
- Conference Space

PARK AND FACILITIES MANAGEMENT:

The offer has been tailored to cover three main areas:

Estate Services

The Service Charge will include the normal range of services including park security, park management, pest control, mechanical and electrical services, external landscaping and maintenance of common parts. In addition to ensuring that the Park provides good services and a high quality business environment it is important that the cost is reasonable and good value. The Grosvenor Service Centre will continue to develop the Park Services and constantly monitor its own performance and that of its suppliers. Active feedback will be encouraged from all of the Park occupiers and the Park Manager will be responsible or the overall quality assurance of all the services provided.

Building Services

These are services that are procured by the The Grosvenor Service Sentre, and provided to Customers of the Park on a menu basis. The aim is to provide an alternative to customers to direct employment of suppliers and where we can provide better value provided or greater convenience. The Grosvenor Service Centre will already provide many of these services on the Park and this will enable us to develop a sound infrastructure that can offer competitive pricing, flexibility and constantly monitored quality levels. The Grosvenor Service Centre will directly interface with the customer via the Park manager to obtain their requirements and set up the individual contracts with preferred suppliers.

Personal Support Services

Edinburgh Technopole have identified and selected numerous local suppliers who understand the unique environment on the Park and can provide high quality services and cater for many of the tenants needs including but not limited too:

- Catering/ Sandwich deliveries
- Milk/ newspaper deliveries
- Reprographics
- Recycling
- Dry Cleaning collection and delivery
- Stationery
- Internal Plants Displays/ Flower Displays/ personal flowers and gifts
- Taxi services
- Courier services

IT/ INFRASTRUCTURE

Edinburgh Technopole is fully broadband enabled.

Grosvenor has partnered with Centric Telecom, one of the UK's leading broadband service providers, to deliver a highly resilient and low cost fibre optic network throughout the Park.

This means that occupiers can access a full range of services with high-speed Internet connectivity from 0.5 meg to 100 meg, including firewalls, virus scanning and remote data back up.

<table>
<tr><td>Map of Tech Park</td><td></td><td>


</td></tr>
<tr><td>Principal Technologies in Tech park</td><td></td><td>Science, Bio-Medical, Computer, Telecom, Technical Consulting, Energy, Environmental, Financial, Business, Industrial Technology</td></tr>
</table>

Availability of Human Capital		• Educated and experienced workforce – ease of recruiting and retaining top staff • Superb quality of life in or near attractive major city • Opportunities for networking and collaboration with neighboring organizations • Convenient transport links • Better and faster interactions with customers and suppliers • Edinburgh has been recognized as one of the only three UK regions to receive " The Award of Excellence for Innovative Regions" from the European Commission.
Tenant Firms		Despite being comparatively young, Edinburgh Technopole is already home to five companies: Indigo Vision, Texonet, Mindchute, Xilinx and Sigma Seven with expertise in areas ranging from video technology to consultancy and development services. In addition, each building has at least one tenant, showing that the Technopole can cater for almost any company, whatever their requirements.
Tenant Firm Profiles		**Indigo Vision** IndigoVision Ltd Charles Darwin Building The Edinburgh Technopole Bush Loan Edinburgh EH26 0PJ Scotland, U.K. T: +44 (0)131 475 7200 F: +44 (0)131 475 7200 Founded in 1994, IndigoVision has established itself as the leading manufacturer of complete IP-based system solutions for transmission, control and storage of live-networked video for the security surveillance market. They have invested over $40m in developing the most advanced and comprehensive product range currently available in the marketplace, together with an experienced and capable worldwide network of system integrators. IndigoVision are a worldwide pioneer in IP Video and have won these prestigious projects: • Provision of the backbone for the entire 2004 Olympics security system • 1 st and largest airport IP video system worldwide - Brussels, 750 cameras • 1 st and largest deployment of IP video to a UK city centre - Monmouthshire • 1 st deployment of IP Video to a high security prison - Holland • Surveillance system for shipping along the entire St Lawrence Seaway • Largest IP Video system in a UK airport - London Luton • 2 of last 3 G8 summits IndigoVision has been located at the Technopole since 1997. In 2003 its employees became the first tenants of Charles Darwin House. For more information please visit www.indigovision.com

Texonet

Texonet Ltd.
Technopole Centre
Bush Research park
Edinburgh
EH26 0PJ

info@texonet.co.uk
Telephone: +44 (0) 131 448 0202
Fax: +44 (0) 131 448 0303

TexoNet is an engineering and IT services company whose expertise is in creating links between consumers of information and providers of data.

Many companies offering data integration services operate in either the engineering or the business sectors. TexoNet works across both sectors and integrates management, production and engineering information systems.

TexoNet releases the value of data by improving its flow, accessibility and usability: raw data becomes business information.

TexoNet currently have offices in the Technopole Centre.

For more information please visit: www.texonet.co.uk

Mindchute

Mindchute was established in 2002 to satisfy the growing demand for e-Learning solutions. Mark Reilly, the director of Mindchute, has been involved with e-Learning for over 7 years and relishes projects where a custom solution to training requirements is required when boxed solutions have failed to deliver. E-Learning is much more than web based training.

Xilinx

Xilinx is a world leader in a growing segment of the semiconductor industry, developing and producing Programmable Logic Devices (PLDs) it is relocating its entire European research and development function to Edinburgh Technopole in a £1 million plus move. In 2004 Xilinx supplied more than 50% of the global market for PLDs. The company will relocate 32 current employees and recruit a further 25 specialists in digital signal processing engineering. The new R&D headquarters will develop new intellectual property for Xilinx, specialising in advanced product development and design support services.

Colin Carruthers, the Senior Manager of Xilinx in Scotland, completed a PhD in Electrical Engineering at the University of Edinburgh. He then became involved in University spin-out company - which was eventually bought over by Xilinx.

Colin said: "In less than ten years of operation, our Scottish research team has developed a powerful international reputation exporting our ideas, knowledge and products to our HQ in the States and ultimately to 7,500 customers worldwide.

		Our Scottish operation has a crucial part to play in increasing our already dominant global market share. We look forward to achieving this at Edinburgh Technopole and continuing to access Scottish talent and expertise." Xilinx will complete the move to Edinburgh Technopole by October 2005, and will be based at Charles Darwin House. The company will occupy 11,843 sq ft of space over two floors. For more information please visit: www.xilinx.com **Sigma Seven** Sigma Seven is a leading supplier of innovative mapping and spatial information management tools, with in-depth experience in the Utility and Network Asset Management industries. Maps are the life-blood of many organisations and ensuring field and office staff are making effective use of the most up-to-date mapping is vital to business success. Sigma Seven integrate map viewing, red-lining, field data capture, satellite navigation and mobile communications into systems that inter-work with their customers' corporate GIS and mobile workforce strategies. The company's GeoField software solutions are in use with leading utilities such as ScottishPower and Scottish Water, in both field and office environments.
Assessment of Success or Failure		The conclusion is that this Technology park is **somewhat successful**. It provides a wide variety of services to the tenant firms. High quality access to data connectivity, good proximity to a major university and presence of local competition to spur efficiency and innovation.
KSFs or KFFs		**1. Factor Conditions** **a. Availability of Infrastructure** – Infrastructure is a key element in the success of Edinburgh Technopole. A technology park requires sophisticated up to date communication technology and Edinburgh Technopole provides it to their tenants. • Availability of Flights and Airports – Edinburgh is an international business location, with Scotland's fastest growing airport offering:Over fifty flights a day to London; Other UK destinations include Birmingham, Manchester,Leeds, Bristol; European connections include Paris, Amsterdam, Madrid, Brussels, Frankfurt, Rome and Geneva; US Connections from nearby Glasgow Airport include New York; Direct link from Edinburgh to New York (From June

2004) [1]

Modern communication infrastructure – Wire workplace Broadband connectivity. Edinburgh Technopole is fully broadband enabled. Grovenor has partnered with Centric Telecom, one of UK's leading broadband service providers, to deliver a highly resilient and low cost fibre optic network throughout the Park. This means that occupiers can access a full range of services with high-speed internet connectivity from 0.5 Meg to 100Meg, including firewalls, virus scanning and remote data backup. tenants can choose from a menu of services to match requirements. [1]

b. Availability of Labor – Presence of Skilled Labor due to proximity to a major universities.

- Existence of Higher Education institutions – There are currently a major university near Edinburgh Technopole. It is the University of Edinburgh [2] (See map above)

2. Firm Strategy and Rivalry

a. Regional Presence of Competitors

- Number and nature of competitors - In close proximity to Edinburgh Technopole there is Biocampus, Roslin Institute, and Pentlands Science Park.

Notes:

1 http://www.edinburghtechnopole.co.uk/home.asp - Edinburgh Technopole website

2 www.ed.ac.uk – *The University of Edinburgh website*

A1.4 Important Note

A large portion of the contents of the various profile tables in this appendix have been directly copied from various electronic sources, including the internet sites of the identified technology parks, authorities, and government support institutions etc.. We wish to acknowledge that this is the case and that this was necessary due to the volume of the content that needed to be collected and compared. This note represents clear notification that we are not representing that we created this material in the form presented.

Appendix 2

A2 Park Officials, Authorities and Experts

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Argentina	AIPyPT- Asociación de Incubadoras de Empresas, Parques y Polos Tecnológicos de la República Argentina	Hernán Alberto Bacarini	President			hbacarini@infovia.com.ar		
Argentina	Parque Tecnológico del Litoral Centro - Ceride	Julio LUNA	General Director			ptl@ceride.gov.ar		
Argentina	Polo Tecnologico Constituyentes - P.T.C.	Carlos GIANELLA	General Manager			cgianell@unsam.edu.ar		
Argentina	Polo Tecnologico Constituyentes - P.T.C.	Esteban CASSIN	Incubator Manager			ecassin@correo.secyt.gov.ar		
Austrailia	Canberra Technology Park	Rachel Ozerskis		(612-6162-5136)	612-6242 5090	rachelo@canberratechpark.com	Phillip Avenue, Watson, ACT 2602	
Austrailia	Land Management Corporation Innovation House	Marteine Edwards	Business Development Manager	+61 08 8260 5131	61 08 8260 8100	edwards.marteine@lmc.sa.gov.au	Mawson Lakes SA 5095, Australia	www.techpark.sa.gov.au.
Austrailia	Macquarie University Research Park	Mr. Adrian Briggs		+61 2 9850 6843	61 2 9850 6906	adrian.briggs@mq.edu.au	Sydney, NSW 2109, Australia	www.murp.mq.edu.au
Austrailia	Technology Park Adeliade	Marteine Edwards		618-8260-8111	618-8260-8100	edwards.marteine@lmc.sa.gov.au	Technology Park Adelaide, Mawson Lakes,South Australia, 5095	
Australia	Adelaide University Research Park	John HODGES	Manager			john.hodges@adelaide.edu.au		
Australia	Australian Technology Park Precinct Management Ltd.	Stephen Montgomery				atpinfo@shfa.nsw.gov.au		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Australia	Brisbane Technology Park	Peter GLASBY	Manager			gill@zernikeaustralia.com.au		
Australia	Brisbane Technology Park	Peter Why		61 08 9451 0888		peter.why@zernikeaustralia.com.au	BTP Technology & Conference Centre, 1 Clunies Ross Court (off Miles Platting Rd), Eight Mile Plains, Brisbane, QLD 4113	
Australia	Innovation Centre Sunshine Coast Pty Ltd	Colin GRAHAM	CEO			cgraham@usc.edu.au		
Australia	LaTrobe University Research & Development Park	Steve Luxford				s.luxford@latrobe.edu.au		
Australia	Macquarie University Research Park	Bill Steele				MURP@mq.edu.au		
Australia	Riverside Corporate Park	George HARLEY	General Manager			george.harley@csiro.au		
Australia	Technology Park Adelaide	Kathy Laycock				laycock.kathy@lmc.sa.gov.au		
Australia	Technology Park Adelaide	Brent DANKS	Commercial Manager			danks.brent@lmc.sa.gov.au		
Australia	Technology Park Western Australia	David TAYLOR	Adviser			david.taylor@aotconsulting.com		
Australia	Technology Park Western Australia	Peter WHY	Executive Officer, Technology Precinct			peter.why@zernikeaustralia.com.au		
Austria	Lakeside Science & Technology Park	Hans SCHÖNEGGER	General Manager			info@lakeside-scitec.com		
Austria	Tech Gate Vienna Science and Technology Park	Stephan GRÜNDORFER	Coordinator Science - Technology			office@techgate.at		
Austria	Techno-Z Network Company - The Salzburg Enterprise Network	Werner PFEIFFENBERGER	Managing Director			office@techno-z.at		
Bahrain	Bahrain Technology Park	Mohamed Al-Shemmary	CEO			fouad@btp.com.bh		
Belgium	CREALYS®- Science Park of the Province of Namur	Stephanie BONMARIAGE	Manager			sbo@bep.be		
Belgium	Investparks SA	Marc Deschamps	Chairman	32 68 840705	32 68 283784	info@investparks.com	Ath , Hainaut7800, Belgium	www.investparks.com
Belgium	Louvain-la-Neuve Science Park	Jean-Marc Simoens	Science Park Manager			simoens@parc.ucl.ac.be		
Belgium	Researchpark Waterfront - University of Antwerp	Marc VAN BOVEN	Chairman Management Committee			researchpark@waterfront.be		
Brazil	Anprotec	Luis Bermudez				anprotec@cdt.unb.br		
Brazil	Associação de Desenvolvimento Tecnológico do Vale - VALETEC	Filipe Ramos Barroso	Executive Director			valetec@valetec.org.br		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Brazil	Instituto PROINTER	Héctor Hernán González Osorio	Director			hernan@prointer.com.br		
Brazil	Parque Tecnológico do Rio	Mauricio GUEDES Pereira	General Manager			mauricio@inc.coppe.ufrj.br		
Brazil	Parque Tecnologico UNIVAP	Antonio De Souza Teixeira Júnior	Vice-President			gabinete@univap.br		
Brazil	Secretaria de Estado de Ciencia, Tecnologia e Ensino Superior	Anna Flavia Lourenco E M Bako				anna.bako@tecnologia.mg.gov.br		
Brazil	The Technology Park of Sao Paulo	Desirée ZOUAIN				dmzouain@ipen.br		
Brazil	Universidade Federal do Rio Grande do Sul	Maria Alice Lahorgue	Secretaria de Desenvolvimento Tecnológico			ufrgs@ufrgs.br		
Bulgaria	Technology Center - Institute of Electronics	Krasimira Velkova				ime@tcime.bg		
Canada	Calgary Technologies Inc	John Masters	President	(403) 284-6424	(403) 282-1238	jmasters@calgarytechnologies.com	Calgary , AlbertaT2V 4Z2, Canada	www.ucalgary.ca
Canada	Director General's Office	Mr. Keith Parsonage	Director General	(613) 954-5598				
Canada	Discovery Parks	Mr. Mark Betteridge	Executive Director and CEO	(604) 734-7275	(604) 734-7278	markbetteridge@discoveryparks.com	Vancouver , BCV6H 4C1, Canada	www.discoveryparks.com
Canada	Discovery Parks Inc.	Mark Betteridge		6047347275	6047347278	msbetteridge@discoveryparks.com	Suite 750, 1333 W. Broadway,Vancover, BC V6H 4C1, Canada	www.discoveryparks.com
Canada	Edmonton Research Park	John S. Anderson	Property Manager	(780) 462-2121X221	(780) 436-2762	janderson@edmonton.com	Edmonton , ABT6N 1G1, Canada	www.edmonton.com/researchpark
Canada	Enterprise UNB Incorporated	Dr. Brenda Moxon	Executive Director	(506) 453-4500	(506) 453-3541	enterprise@unb.ca	Fredericton , NBE3B 6C2, Canada	www.unb.ca/enterprise
Canada	InNOVAcorp	David O. Mcnamara	Director of Incubation	(902) 421-5606	(902) 421-2733	dmcnamara@innovacorp.ns.ca	Halifax , NSB3J 1S5, Canada	www.innovacorp.ns.ca
Canada	Innovation Place	Austin Beggs	Director of Marketing & Corp Development	(306) 933-7464	(306) 933-8215	austin@innovationplace.com	Saskatoon , SaskatchewanS7N 2X8, Canada	www.innovationplace.com
Canada	Innovation Place	Doug Tastad		3069336295	3069338215	Tastad@innovationplace.com	114-15 Innovation Blvd.,Saskatoon, SK S7N 2X8, Canada	www.innovationplace.com
Canada	Innovation Place	Mr. Doug Tastad	President	(306) 933-6258	(306) 933-8215	tastad@innovationplace.com	Saskatoon , SKS7N 2X8, Canada	www.innovationplace.com
Canada	Innovation Place *	Mr. Doug Tastad				tastad@innovationplace.com		http://www.innovationplace.com/html/frameset.html
Canada	Knowledge Park	Mr. Doug Motty	Executive Director	(506) 444-4686	(506) 444-4649	ent-fredericton@ent-fredericton.ca	Fredericton , NBE3B 6Z6, Canada	www.knowledgepark.ca
Canada	Laval Technoparc			(450) 681-0003	(450) 681-1633	info@citebiotech.com	Laval , QBH7V 3Z1, Canada	www.lavaltechnopole.gc.ca

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Canada	MaRS Discovery District	Mr. John A. Cook	President and Chief Operating Officer	(416) 673-8103	(416) 673-8181	jcook@marsdd.com	Toronto , ONM5G 1L7, Canada	www.marsdd.com
Canada	MBA Inc	Mr. Mark Betteridge		+1 604 734 7275		markbetteridge@discoveryparks.com	Vancouver	
Canada	McMaster University Office VP Research & International Affairs	Nick Markettos	Acting Executive Director	(905) 525-9140x26975	(905) 521-1993	nick.markettos@mcmaster.ca	Hamilton , OntarioL8S 4L8, Canada	http://www.mcmaster.ca/research
Canada	Ottawa Global Marketing [http://www.ottawaregion.com]			(613) 828-6274	:(613) 726-3440		200 - 2625 Queensview Drive Ottawa, ON K2B 8K2	
Canada	Ottawa Technology Park	General Contact		1 (888) 5 OTTAWA		request@ocri.ca	36 Steacie Drive, Ottawa, Ontario, K2K 2A9,	
Canada	Ottawa Technology Park	Jeffrey Dale	President and CEO	(613) 592-8160 ext. 267		jdale@ocri.ca	36 Steacie Drive, Ottawa, Ontario, K2K 2A9,	
Canada	Research and Development Park at UNBC	Max Blouw		2509605011	2509605746	Blouw@unbc.ca	3333 University Way,Prince George, BC V2N 4Z9, Canada	www.unbc.ca
Canada	St-Laurent Techno park. (In Montreal Cluster)	Mr. Michel Leblanc	Vice-President, Life Sciences	(514) 987-8191	(514) 956-2529	michel.leblanc@montrealinternational.com	380 St. Antoine Street West, Suite 8000, Montreal, Quebec, H2Y 3X7	www.lifesciences-montreal.com
Canada	St-Laurent Techno park. (In Montreal Cluster)	Charles S. Bourgeois	Vice-President, Information Technology	(514) 987-8191 x 321	(514) 956-2529	charles.s.bourgeois@montrealinternational.com	380 St. Antoine Street West, Suite 8000, Montreal, Quebec, H2Y 3X7	www.lifesciences-montreal.com
Canada	Sunnybrook/Women's College Hlth Sc. Ctr	Mr. Leslie Boehm	Director, Research Admin.	(416) 480-5720	(416) 480-5814	leslie.boehm@swchsc.on.ca	Toronto , ONM4N 3M5, Canada	
Canada	Sunnybrook/Women's College Hlth Sc. Ctr	Mr. Leslie Boehm		+1 416 480 5720		leslie.boehm@swchsc.on.ca	Toronto	
Canada	Technoparc Saint-Laurent	Claude Normandeau	President and Chief Executive Officer	Technopark : (514) 956-2520	(514) 956-2529	norma@technoparc.com	380 St. Antoine Street West, Suite 8000, Montreal, Quebec, H2Y 3X7	
Canada	Technoparc Saint-Laurent	Claude Normandeau	President	(514) 956-2520	(514) 956-2529	norma@technoparc.com	Saint-Laurent , PQH4S 2C1, Canada	www.technoparc.com
Canada	Technoparc St. Laurent, Montreal Metropolitan	Claude Normandeau		5149562525	5149562529	Norma@technoparc.com	7150 Albert Einstein, Suite 200,Montreal, QC H4S 2C1, Canada	www.technoparc.com
Canada	University of Alberta	Mr. Don Hickey		+1 780 492 9238		don.hickey@ualberta.ca	Edmonton	http://www.ualberta.ca/
Canada	University of Alberta	Mr. Don Hickey	Vice President-Facilities & Operations	(780) 492-9238	(780) 492-1439	don.hickey@ualberta.ca	Edmonton , ABT6G 2J9, Canada	www.ualberta.ca
Canada	University of Guelph	Ms. Barbara R. Reid		+1 519 767 5018		brreid@realestate.uoguelph.ca	Guelph	http://www.realestate.uoguelph.ca/
Canada	University of Guelph	Ms. Barbara R. Reid	Project Management Assistant	(519) 767-5018	(519) 763-4974	brreid@realestate.uoguelph.ca	Guelph , ONN1G 1M8, Canada	www.realestate.uoguelph.ca
Canada	University of Northern British Columbia	Mr. D. Max Blouw	Vice President of Research	(250) 960-5820	(250) 960-5746	blouw@unbc.ca	Prince George , BCV2N 4Z9, Canada	www.unbc.ca

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Canada	University of Waterloo Research & Technology Park	Ms. Carol A. Stewart		+1 519 888 4567		castewar@uwaterloo.ca	Waterloo	
Canada	University of Waterloo Research & Technology Park	Carol A. Stewart	Business Development Manager	(519) 888-4567x6339	(519) 746-6810	castewar@uwaterloo.ca	Waterloo , ONN2L 3G1, Canada	www.rtpark.uwaterloo.ca
Canada	University of Western Ontario Research and Development Park	Ker Ferguson		5198585198	5198585197	wferguso@uwo.ca	100 Collip Circle,London, ON N6G 4X8, Canada	
Canada	University of Western Ontario Research Park	Mr. Joel Adams	Director	(519) 858-5150	(519) 858-5197	jadams@uwo.ca	London , ONN6G 4X8, Canada	www.uwo.ca/researchpark
Canada	Vancouver Island Technology Park	Sandy Beaman		2504833200	2504833201	sbeaman@vitp.ca	4464 Markham Street,Victoria, BC V8Z 7X8, Canada	www.vitp.ca
Canada	Vancouver Island Technology Park	Dale Gann	Vice President	(250) 483-3217	(250) 483-3201	dgann@vitp.ca	Victoria , BCV8Z 7X8, Canada	www.vitp.ca
Canada	VARENNES DEVELOPPEMENT Parc Scientifique de Varennes	Marc ARCHAMBAULT				i.noel@ville.varennes.qc.ca		
Canada	BioMed Développement - Sherbrooke Biomedical Park	Mario DESLONGCHAMPS	Director			biomed@biomed.ca		
Canada	Corporation de développement économique de Gatineau	Mario LEBEAU				lebeau.mario@ville.gatineau.qc.ca		
Canada	Innovation Place Research Park*	Austin BEGGS	Director of Marketing and Corporate Development			austin@innovationplace.com		
Canada	Laval Technopole	Pierre BELANGER	Director General			pierre.belanger@lavaltechnopole.qc.ca		
Canada	Longueuil Economic Development (DEL)	Suzanne BENOIT	Chief Executive Officer			info@del.longueuil.ca		
Canada	Quebec Metro High Tech Park	Carole VOYZELLE	President & General Manager			admin@parctechno.qc.ca		
Canada	Technoparc Saint-Laurent *	Mr. Claude Normandeau				norma@technoparc.com		http://www.technoparc.com/index-fl.html
Canada	Technoparc Saint-Laurent, Montréal Métropolitain	Claude NORMANDEAU	President & Chief Executive Officer			dessu@technoparc.com		
Canada	Technopole Saint-Hyacinthe-Science Park St-Hyacinthe	Mario DE TILLY	General Manager			martinj@st-hyacinthetechnopole.qc.ca		
Canada	Technopole Vallée du Saint-Maurice	Francine BONICALZI				technopole@uqtr.ca		
Canada:	University of Calgary	Dr. Martin Kirk Phd	Director of Research Services and Associate To the Vice President	(403) 220-4613	(403) 289-0693	dmjkirk@ucalgary.ca	Calgary , AlbertaT2N 1N4, Canada	www.ucalgary.ca

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Chile	Fundacion Valle Lo Aguirr-University de Chile	Patricio Rojas	Vice President	(56-2) 228-4818	(56-2) 208-5453	pct@netline.cl	Santiago Region Metropolitana 755-0130, Chile	
Chile	Fundación Valle Lo Aguirre - Universidad de Chile	Patricio ROJAS	Executive Vice President			pct@netline.cl		
China	Beijing Hi-Tech Business Innovation Service Center	Xiaobing Ji	Director			bbia@bestinfo.net.cn		
China	Beijing Peking University Science Park Construction & Development Co., Ltd	Xia Jianzhong	Manager, the Department of International Cooperation			henry-songchun@163.com		
China	E-Government Service Center (Haidian) of Zhongguancun Science Park	Xiuying Zhang	Deputy Director of E-Government Service Center (Haidian) of Zhongguancun Science Park			zhangxy@zhongguancun.com.cn		
China	Nanjing New & High Technology Industry Development Zone	Shi Wei Guo				njhnza@public1.ptt.js.cn		
China	Shanghai Hi-Tech Park United Development Co., Ltd.	Fuxin YANG	Vice President			chj@caohejing.com		
China	Shanghai Zhangjiang Hi-Tech Park	Chen Tao				chent@zjpark.com		
China	Shenyang New and High-tech Industrial Development Zone (Shenyang Hunnan New District)	Zhang SHI	International Relations Officer			sytechnopark@yahoo.com.cn		
China	Shenzhen High-Tech Industrial Park	Yingli Liu	Director General			ship@ship.szptt.net.cn		
China	The Administrative Committee of Jinan Hi-Tech Development Zone of China	Michael WANG	Section Chief of Investment Promotion Bureau			ww@jctp.gov.cn		
China	Tsinghua University Science Park	Iris Shen				shm@thsp.com.cn		
China	Zhengzhou High and New Technology Industries Development Zone	Dong JIANG	International Coordinator			jiangdong@371.net		
China	ZhongGuanCun Haidian Science Park			+86 10 6891 5118	86 10 6891 5214	hdgwh@zhongguancun.com.cn	A7, Baishiqiao Road, Haidian District, Beijing,China, Zip Code: 100081	
China	Zhongguancun Science Park (ZSP)	Wang Guangli				glwang@zgc.gov.cn		

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China	Zhuhai National High Tech Industrial Development Zone			86-756-2616399	86-756-2616099	zhhitech@pub.zhuhai.gd.cn	Address:No.9 Hongshan Road, Zhuhai, China, Zipcode:519001	
China (Macao)	SDPIM - Macao Industrial Parks Development Co., Ltd.	Stella CHEOK	Senior Executive			spic@macau.ctm.net		
China (Macao)	SDPIM - Macao Industrial Parks Development Co., Ltd.	Paulina Y Alves Dos Santos	President of the Board			sdpim@macau.ctm.net		
Colombia	Agronatura Science Park /CIAT	Aart VAN SCHOONHOVEN	Director, CIAT Commercial			a.schoonhoven@cgiar.org		
Colombia	Parque Tecnológico de Antioquia, S.A.	Luz Elena Zabala Jaramillo	Manager			gerencia@parquePTA.org		
Colombia	Parque Tecnológico de Guatiguará	Jorge GOMEZ DUARTE				partegua@uis.edu.co		
Colombia	Parque Tecnológico de la Umbría - Universidad San Buenaventura de Cali	Héctor Andrés Hermida Rengifo	Director Proyectos Especiales			hhermida@usb.edu.co		
Cuba	Oficina Nacional de Zonas Francas	Silvia CASTAÑER				silvia@oninvex.co.cu		
Cyprus	Athena High Technology Incubator Ltd.	Phanos PITIRIS	General Manager			info@athena-tech.net		
Czech Republic	Technology Park Brno a.s.	Roderick BARKER ARICS	General Manager			roderick.barker@technologypark.cz		
Denmark	Agro Business Park A/S	René DAMKJER				info@agropark.dk		
Denmark	NOVI A/S - Science Park and Venture Company	Poul ERNST RASMUSSEN				novi@novi.dk		
Denmark	Novem	Peter KJELDBJERG				novem@novempark.dk		
Denmark	Science Park Aarhus Ltd.	Erik JANTZEN	Managing Director			fp@adm.sp-aarhus.dk		
Denmark	Scion DTU a/s	Preben PAMSGAARD	Manager			pp@sciondtu.dk		
Ecuador	Technopark Ecuador	Sergio FLORES				technopark@espol.edu.ec		
England	Lee Valley Technopark	Chris Samples		020 8880 3636	020 8880 3443	technopark@lvc.leevalley.co.uk	Ashley Road, Tottenham, London N17 9LN	
England	MerseyBio			0151 795 4111	0151 795 4101	gwainwright@merseybio.com	MerseyBIO Crown Street, Liverpool L69 7ZB	
England	BioCity Nottingham	Glenn Crocker	CEO	0115 912 4210	0115 912 4281	G.Crocker@biocity.co.uk	Pennyfoot Street, Nottingham NG1 1GF	
England	Cardiff Business Technology Centre	Eileen Verallo	Centre Administrator	0292 064 7000	0292 064 7009	enquiries@cbtc.co.uk	Cardiff CF14 4UJ	
England	De Montfort University	Nicholas O Mahoney	Operations Manager	0116 257 7517	0116 257 7144	nfoadm@dmu.ac.uk	49 Oxford Street, Leicester LE1 5XY	
England	Harwell International Business Centre	Stephen Moss	Head of Central Property Unit	01235 431 650	01235 431 670	steve.moss@ukaea.org.uk	UKAEA Harwell International Business Centre, Didcot, Oxfordshire OX11 0RA	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
England	SGP - Sustainable Growth Park	Phil Hesford		01274 699 400		phil.hesford@urbanmines.org.uk	Castleford, West Yorkshire	
England	South Bank Technopark	Paul Carver	Managing Agents	0207 287 5233	0207 287 5235	paul@granbymartin.com	Granby Martin 50 Conduit Street, London, SE1 6LN	
England	Aston Science Park	Derek Harris	Derek Harris	0121 250 3502	0121 250 3567	derekh@astonsciencepark.co.uk	Birmingham Technology Limited, Faraday Wharf, Holt Street, Birmingham B7 4BB	
England	Babraham Research Campus	David J Hardman		01223 496 062	01223 496 020	ji.laurie@babraham.co.uk	Babraham Bioscience Technologies Limited,Babraham Research Campus, Cambridge CB2 4AT	
England	Begbroke Science Park	Caroline Livingstone		01865 283 784	01865 374 992	caroline.livingstone@begbroke.ox.ac.uk	Oxford University,Sandy Lane Yarnton Kidlington OX5 1PF	
England	Birmingham Research Park Ltd	Pat Marshall		0121 471 4988	0121 415 8542	BRPL@Bham.ac.uk	The ICT Centre,VincentDrive, Edgbaston,BirminghamB15 2SQ	
England	Brunel Science Park	Keith Robson	Director of Brunel Enterprise	01895 272 192	01895 256 581	science-park@brunel.ac.uk	Brunel Science Park, Kingston Lane, Uxbridge, Middlesex UB8 3PQ	
England	Cambridge Research Park	Salima Vivian/ Robert Cragg	Marketing Manager	01223 471 052	01223 471 053	robert.cragg@sloughestates.co.uk	Beach Drive, Waterbeach, Cambridge CB5 9PD	
England	Cambridge Science Park	Juliette Morgan		01223 559 186	01223 840 294	jmorgan@bidwells.co.uk	Bidwell House, Trumpington Road, Cambridge CB2 2LD	
England	Cambridge Technology Park	Jeremy Tuck	MRICS – Property Manager)	01223 841841	01223 559335	jtuck@bidwells.co.uk	24 Cambridge Science Park – The Trinity Centre, Milton Road, Cambridge CB4 4FN	
England	Cane Hill Science and Business Park	John Whittington	Assistant Head of ESDU	0208 604 7019	0208 760 5663	John_whittington@crydon.gov.uk	M23/M25, Croydon, South London Iain Sim, Croydon Council	
England	Cheshire Innovation Park	David Brewster		0151 373 7373	0151 373 5181	cip@opc.shell.com	PO Box 1, Chester CH1 3SH	
England	Chesterford Research Park	Katherine Maguire	Park Manager	01799 532 252	01799 531 669	katherine.maguire@chesterfordresearchpark.com	Chesterford Research Park, Little Chesterford, Essex CM10 1XL	
England	Chilworth Science Park	Don Fox		02380 767420	0238 076 6190	d.fox@csp-ltd.com	2 Venture Road, Chilworth, Southampton SO16 7NP	
England	Colworth Science Park	Sallyann Forsyth	Business Development Director	01234 222 441	01234 222 121	sallyann.forsyth@unilever.com	Colworth Park, Colworth House, Sharnbrook, Bedfordshire MK44 1LQ	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
England	Coventry University Technology Park	Sharon Simkiss		0247 623 6262	0247 623 6024	s.simkiss@coventry.ac.uk	TechnoCentre, Coventry University Technology Park, Puma Way, Coventry CV1 2TT	
England	Cranfield Technology Park	David Newens	Campus Development Officer	01234 754 004	01234 750 972	c.major@cranfield.ac.uk	Cranfield University, Cranfield, Bedford MK43 0AL	
England	Culham Science Centre	Miriam Mason	Technology Transfer Manager	01235 466 609	01235 466 610	miriam.mason@ukaea.org.uk	UKAEA Culham Division, D3 Culham Science Centre, Abingdon, Oxon OX14 3DB	
England	Exeter Science Park	Richard Ball	Head of Economy and Tourism	01392 265140	01392 265625	richard.ball@exeter.gov.uk	Exeter City Council, Economy and Tourism, Civic Centre, Paris Street, Exeter EX1 1JJ	
England	Granta Park	Roger Quince	Managing Director	01223 893 710	01223 893 711	rquince@mepc.co.uk	Granta Park, Great Abington, Cambridge CB1 6GP	
England	Keele University Science Park	Caroline Mairs	Science Park Manager	01782 584 321	01782 583 840	c.s.mairs@keele.ac.uk	Keele, Staffordshire ST5 5NL	
England	Kent Science Park	Nick Sharp	Site Director	01795 411 500	01795 411 511	n.sharp@ksp-uk.com	Woodstock House, Winch Road, Sittingbourne, Kent ME9 8AG	
England	Langstone Technology Park	Chris Allington	Managing Director	0239 249 6000	0239 259 6140	chris.allington@langtp.com	Langstone Technology Park, Langstone Road, Havant, Hampshire PO9 1SA	
England	Loughborough Science Park	Tim Bacon	Project Director	01509 223 633	01509 228 892	t.bacon@lboro.ac.uk	, Loughborough Innovation Centre, Epinal Way, Loughborough LE11 3EH	
England	Malvern Hills Science Park	Nigel Shaw	Manager	01684 585 200	01684 585201	enquiries@mhsp.c.uk	Geraldine Road, Malvern, Worcestershire WR14 3SZ	
England	Manchester Science Park Ltd	Jane Davies	Chief Executive	0161 226 1000	0161 226 1001	ceo@mspl.co.uk	Manchester Science Park Ltd, Kilburn House, Lloyd Street North, Manchester M15 6SE	
England	NetPark - The North East Technology Park			0191 383 2000	0191 386 2974	enquiries@cddc.co.uk	County Durham Development Company Ltd, County Hall, Durham, County Durham DH1 5UT	
England	Newlands Science Park	Bill Walker	Director	01482 466 451	01482 466 852	W.Walker@hull.ac.uk	Knowledge Exchange, University of Hull, Cottingham Road, Hull HU6 7RX	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
England	Norwich Research Park	Jon Carter		01603 450 950		jon.carter@norbio.com	Norwich Bio-Incubator, Norwich Research Park, Colney Lane, Norwich NR4 7UH	
England	Nottingham Science and Technology Park	Cathryn Thacker	Estates Surveyor	0115 915 8011	0115 915 8026	cathrynthacker@nottinghamcity.gov.uk	Nottingham City Council, Severns House, 20 Middle Pavement, Nottingham NG1 7DW	
England	Oxford Science Park	Shannon Blaszko	Manager	01865 784 000	01865 784 004	shannon.blaszko@oxfordsp.com	Robert Robinson Avenue, Oxford OX4 4GA	
England	Sheffield Technology Park	Peter Wood	Chief Executive	0114 - 22 11 800	0114 - 22 11 801	enquiries@shefftechparks.com	Cooper Buildings, Arundel Street – City Centre Site, Sheffield S1 2NS	
England	Sheffield Technology Park - Development Land & Planning Consultants Ltd.	Roland Bolton	Park Mgmt			dlpsheff@sci-tech.org.uk		
England	Sheffield Technology Parks	Peter Wood	Chief Executive	0114 221 1800	0114 221 1801	enquiries@shefftechparks.com	City Centre Site, Cooper Buildings, Arundel Street, Sheffield S1 2NS	
England	St John Innovation Centre	Walter Herriot	Managing Director	01223 420 252	01223 420 844	wjherriot@stjohns.co.uk	St John's Innovation Centre Ltd, Cowley Road, Cambridge CB4 0WS	
England	Staffordshire Technology Park	Paul Adams		01785 277 706	01785 277 712	paul.adams@staffordshire.gov.uk	Green Hall, Lichfield Road, Stafford ST17 4LA	
England	Sunderland Science Park	Paul Mceldon	Chief Executive	0191 516 6053	0191 516 6150	paul.mceldon@ne-bic.co.uk	Sunderland Science Park, Wearfield, Sunderland SR5 2TA	
England	Surrey Research Park	Malcolm Parry	Managing Director	01483 579 693	01483 568 946	m.parry@surrey.ac.uk	30 Frederick Sanger Road, The Surrey Research Park, Guildford, Surrey GU2 7EF	
England	Tamar Science Park	Nigel Halford	Chief Executive	01752 764 200	01752 772 227	nrhalford@sciencepark.org.uk	1 Davy Road, Derriford, Plymouth PL6 8BX	
England	Technium (Swansea)	Stephen Davies		01792 222 457	01792 222 460	steve.t.davies@wda.co.uk	Technium c/o Welsh Development Agency, Plas Glyndwr, Kingsway, Cardiff CF10 3AH	
England	The London Science Park at Dartford	David Fletcher	Project Director	01322 343 073	01322 343 951	susie.mayell@dartford.gov.uk	Dartford Borough Council, Civic Centre, Home Gardens, Dartford, Kent DA1 1DR	
England	The University of Essex Research Park	Harvey Perkins	Managing Director	01206 874 889	01206 873 334	drperkin@essex.ac.uk	University of Essex Research Park Limited, Wivenhoe Park, Colchester, Essex CO4 3SQ United Kingdom	
England	University of Bristol SETsquared Centre	Peter Maxwell		0117 915 1270	0117 903 9001	peter.maxwell@bristol.ac.uk	Emersons Green, Bristol	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
England	University of Nottingham Science Park	David Greenaway		0115 951 5671	115 951 5351		University Park, Nottingham NG7 2RD	
England	University of Reading Science & Technology Centre	Alison Ansell	Director	0118 378 8978	0118 378 8979	a.ansell@reading.ac.uk	Research & Enterprise Services, University of Reading, Whiteknights, Reading RG6 6AH	
England	University of Warwick Science Park	*David Grindrod*	Science Park Manager	024 7632 3003	024 7632 3001	david.grindrod@uwsp.co.uk	Barclays Venture Centre, Sir William Lyons Road, Coventry CV4 7EZ	
England	Westlakes Science & Technology Park	Diana Wilson-Long		01946 595 200	01946 595 202	dwl@westlakesproperties.co.uk	Westlakes Science & Technology Park, Ingwell Hall, Moor Row, Cumbria CA24 3JZ	
England	Wolverhampton Science Park	Andrew Gilson	Assistant Director	01902 824 012	01902 824 005	a.d.gilson@wlv.ac.uk	Glaisher Drive, Wolverhampton WV10 9RU	
England	Writtle College	James Macaskill	Assistant Principal	01245 424200		jamie.macaskill@writtle.ac.uk	Writtle College, Chelmsford CM1 3RR	
England	York Science Park	Susanne Walker	Susanne Walker	01904 435 100	01904 435 135	inov1@york.ac.uk	Innovation Centre, York Science Park, Heslington, York YO10 5DG	
Estonia	Tartu Science Park	Toomas NOOREM	Managing Director			info@park.tartu.ee		
Estonia	TEHNOPOL - Tallinn Technology Park	Raivo TAMKIVI	Member of the Executive Board			raivo.tamkivi@tehnopol.ee		
Finland	Technopolis OYJ	Mr. Pertti Huuskonen	CEO	(358) 8 551-3213	(358) 8 551-3210	pertti.huuskonen@technopolis.fi	Oulu 90570, Finland	www.sciencepark.com
Finland	Hämeenlinna Technology Centre	Pekka JALAVA				pekka.jalava@teknologiakeskus.com		
Finland	Hyvinkään Tech Villa Oy	Timo PULLINEN	Managing Director			techvilla@technivlla.fi		
Finland	Joensuu Science Park Ltd.	Mikko TIAINEN	Senior Vice President			mikko.tiainen@carelian.fi		
Finland	Joensuu Science Park Ltd.	Markku VUORINEN	Managing Director			markku.vuorinen@carelian.fi		
Finland	Jyväskylä Science Park	Antti AUMO				jtk@jsp.fi		
Finland	Lahti Science and Business Park Ltd	Lauri YLÖSTALO	CEO			lauri.ylostalo@lahtisbp.fi		
Finland	Lahti Science and Business Park Ltd	Lauri KUUKASJÄRVI	Director			paivi.tirkkola@neopoli.fi		
Finland	Otaniemi Science Park	Lauri YLÖSTALO				lauri.ylostalo@innopoli.fi		
Finland	Tampere Technology Centre Hermia	Olli NIEMI				olli.niemi@hermia.fi		
Finland	Technology Centre Kareltek Inc .	Marjut HANNELIN	Managing Director			marjut.hannelin@kareltek.fi		
Finland	Technology Centre Teknia Ltd.	Hannu JANHUNEN	Managing Director, M.Sc.			hannu.janhunen@teknia.fi		
Finland	Technology Centre Teknia Ltd.	Arsi ITKONEN	Development Manager			arsi.itkonen@teknia.fi		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Finland	Technopolis Plc.	Pertti HUUSKONEN	CEO			pertti.huuskonen@technopolis.fi		
Finland	Turku Science Park	N. Tapani Saarinen	Vice President, Business Development			tapani.saarinen@turkusciencepark.com		
France	(Méditerranée Technologies)	Jean ZIEGER				zieger@mediterranee-technologies.com		
France	Angers Technopole	Jean QUESSADA				contact@angerstechnopole.com		
France	Atlanpole, the Nantes Atlantique Technopole and Business Incubator	Jean François Balducchi	General Manager			balducchi@atlanpole.fr		
France	ESTER Limoges Technopole	Jean Marie Gouezou				ester@ester-technopole.org		
France	Europôle Méditerranéen de l´Arbois	Claude REYNOIRD				info@europole-med-arbois.org		
France	FTEI - France Technopoles Entreprises Innovation	Jean François Balducchi				info@reseauftei.com		
France	Futuroscope Poitiers Technopoles	Gérard BIETTE	Director of Financial Development			gbiette@cg86.fr		
France	Helioparc Pau-Pyrenees	Jean-Marie Vergé				l.latour@helioparc.fr		
France	Laval Mayenne Technopole	Guy LE BRAS				technopole@laval-technopole.fr		
France	Méditerranée Technologies	Daniel PARDO				info@mediterranee-technologies.com		
France	Metz Technopôle	Philippe NETTER				pnetter@wanadoo.fr		
France	Orleans Val de LoireTechnopole	Olivier JOUIN	Director			ojouin@tech-orleans.fr		
France	SAEM SOPHIA ANTIPOLIS CÔTE D'AZUR	Jacques MASBOUNGI	Managing Director	33 (0)4 92 94 59 94	33 (0)4 93 65 40 69	masboungi@sophia-antipolis.net	Place Joseph Bermond - BP 33, 06901 SOPHIA ANTIPOLIS CEDEX	
France	Savoie Technolac	Jean-Jacques Duchene				technopole@savoie-technolac.com		
France	SOPHIA ALPES MARITIMES PROMOTION (www.investincotedazur.com)	Philippe SERVETTI	Marketing Director	33 (0)4 92 17 51 51	33 (0)4 93 80 05 76	servetti@cad.fr	400 Promenade des Anglais - BP 3185, 06204 NICE CEDEX 3 - FRANCE	
France	Sophia Antipolis Science Park			04 92 96 78 00		info@sophia-antipolis.org	Place Sophie Laffitte BP 217, 06904 Sophia Antipolis Cedex	
France	Sophia Antipolis Science Park	Jean LEONETTI (CASA)				laffitte@sophia-antipolis.org		
France	Sophia Antipolis Science Park	Jean-Pierre Mascarelli (Cad Et Symisa)	Chairman			jpmascarelli@cad.fr		
France	Sophia Antipolis Science Park	Christian CABROL (SAEM SAEM)	Directeur Commercial			ccabrol@sophia-antipolis.net		

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France	Sophia Antipolis Science Park	Christian CABROL	Commercial Manager	33 (0)4 92 94 59 94	33 (0)4 93 65 40 69	ccabrol@sophia-antipolis.net	Place Joseph Bermond - BP 33, 06901 SOPHIA ANTIPOLIS CEDEX	
France	Technopole Brest-Iroise	Michel MORVAN				ronan.stephan@tech-brest-iroise.fr		
France	Technopole Marseille Château-Gombert	Carine SCHLEWITZ				schlewitz@marseille-innov.asso.fr		
France	Technopole Rennes Atalante	Jacqueline POUSSIER				technopole@rennes-atalante.fr		
France	Technopole Toulouse Sud-Est	Claudine SUBRA-MAZOYER				info@sicoval.fr		
Germany	Adlershof Projekt GmbH	Walter Leibl	Head of Planning and Site Development Division	+49 (0) 30 / 6392-3930	+49 (0) 30 / 6392-3909	walter.leibl@adlershof-projekt.de		
Germany	Adlershof Projekt GmbH	Nedim Bayat	Head of Finance/Controlling Division	+49 (0) 30 / 6392-3920	:+49 (0) 30 / 6392-3906	nedim.bayat@adlershof-projekt.de		
Germany	Adlershof Projekt GmbH	Gerhard W. Steindorf	CEO Adlershof Projekt GmbH	011-49-30-6392-3902	011-49-30-6392-3901	info@adlershof-projekt.de	Rudower Chaussee 19, 12489 Berlin	
Germany	Adlershof Projekt GmbH	Robert-Christian Gierth	Head of Property Sales Division	+49 (0) 30 / 6392-3905	+49 (0) 30 / 6392-3933	robert.gierth@adlershof-projekt.de		
Germany	Adlershof Projekt GmbH	Rolf-Dieter Schlaubitz		011-49-30-6392-1930	011-49-30-6392-1931	schlaubitz@afm-gmbh.de	Kekuléstrasse 2-4	
Germany	IVG Immobilien AG	Thomas RÜCKER				Thomas.Rucker@ivg-ag.de		
Germany	Technologiepark Heidelberg GmbH	Klaus PLATE	Managing Director. CEO			platek@heidelberg.de		
Germany	Technologiepark Heidelberg GmbH	Pamela Bogner		011-49-62-2140-8619	011-49-62-2145-1977	pamela.bogner@gmx.de	Im Neuenheimer Feld 515	
Germany	Technologiepark Heidelberg GmbH	Wolfgang Sprengel		-6512972	-6513001	wolfgang.sprengel@rn-immobilien.de	RN Immobilienmanagement GmbH Rhein Neckar, Im Neuenheimer Feld 582, 69120 Heidelberg, Germany	
Germany	Technologiepark Heidelberg GmbH	Dr. Klaus Plate Ceo		011-49-62-1582-0500	011-49-62-1582-0990	klaus.plate@heidelberg.de	Marktplatz 10 D-69117 Heidelberg	
Germany	Technologiepark Ostbrandenburg GmbH	Martin WILKE				wilke@icob.de		
Germany	Technologiepark Ostfalen	Bernd JULING	Vice General Manager			juling@tpo.de		
Germany	WISTA-MANAGEMENT GMBH	Dipl.-Biol. Heidrun Terytze	Center Manager Environmental, Bio and Energy Engineering	+49 (0) 30 / 6392-2221	+49 (0) 30 / 6392-2212	terytze@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dipl.-Ing. Jörg Israel	Center Manager Materials and Microsystem Technologies	+49 (0) 30 / 6392-2216	+49 (0) 30 / 6392-2235	israel@wista.de	Rudower Chaussee 17, 12489 Berlin	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Germany	WISTA-MANAGEMENT GMBH	Dr. Bernd Ludwig	Center Manager Photonics and Optical Technologies	+49 (0) 30 / 6392-2252	+49 (0) 30 / 6392-2246	b.ludwig@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Gerald Bielfeldt	Manager Controlling/Finances, Authorised Officer	+49 (0) 30 / 6392-2291	+49 (0) 30 / 6392-2253	bielfeldt@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Hardy Rudolf Schmitz	CEO Adlershof Projekt GmbH & WISTA-MANAGEMENT GMBH	011-49-30-6392-2202	011-49-30-6392-2203	schmitz@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dipl.-Ing. Gerhard Lindner	Manager Planning / Construction / Infrastructure	+49 (0) 30 / 6392-2285	+49 (0) 30 / 6392-2199	lindner@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dr. Peter Strunk	Manager Communication	011-49-30-6392-2247	011-49-30-6392-2199	strunk@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dipl.-Ing. Susann Niemeyer	Center Manager Information and Media Technologies	+49 (0) 30 / 6392-2237	+49 (0) 30 / 6392-2244	niemeyer@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dr. Helge Neumann	Manager International Office	+49 (0) 30 / 6392-2231	+49 (0) 30 / 6392-2204	helge@wista.de	Rudower Chaussee 17, 12489 Berlin	
Germany	WISTA-MANAGEMENT GMBH	Dr. Peer Ambrée	Manager Technology Centres	011-49-30-6392-4754	+49 (0) 30 / 6392-2235	ambree@wista.de	Rudower Chaussee 17, 12489 Berlin	
Greece	Attica Technology Park	Emmanuel FLORATOS				graf.proedrou@gel.demokritos.gr		
Greece	Science and Technology Park of Crete (Step-C)	Artemis SAITAKIS				edap@stepc.gr		
Greece	SCIENCE AND TECHNOLOGY PARK OF EPIRUS S.A.	Dimitrios FOTIADIS	President of the Board			fotiadis@gaia.cs.uoi.gr		
Greece	Thessaloniki Technology Park	Iacovos VASALOS				park@thestep.gr		
Hong kong	Hong Kong Science and Technology Parks Corporation	C.D. Tam				cd.tam@hkstp.org		
Hungary	Information Technology and Technology Innovation Park Co.Ltd. (InfoPark Co., Ltd).	Gábor SZABÓ				szabo.gabor@infoparkrt.hu		
Hungary	INNOTECH Innovation Park of the Technical University of Budapest	Zoltán PÁLMAI				innotech@innotech.hu		
Hungary	Pécsi Ipari Park Rt	Peter KÉKES				pip@dravanet.hu		
India	Directorate of Information Technology and Biotechnology	Mr. Rakesh Singh	Director	91-80-22263206, 22266293	91-80-22250143	itdir@bangaloreit.in		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
India	Government of Karnataka	Mr. M. K. Shankaralinge Gowda	Secretary to Government	91-80-22280562, 22032434	91-80-22288341	itsec@bangaloreit.in	Dept.of Information Technology, Biotechnology and Science & Technology	
India	Government of Karnataka	Mr. M. K. Shankaralinge Gowda	Secretary to Government		91-80-22288341	biosec@bangaloreit.in	Dept.of Information Technology, Biotechnology and Science & Technology	
India	ICICI Knowledge Park	Deepanwita CHATTOPADHYAY				info@icicikp.com		
India	Information Technology Park Ltd			+91 80 28410570	+91 80 28410588	web@intltechpark.com		
India	Kerala Industrial Infrastructure Development Corporation (KINFRA)	G.C. Gopala Pillai				kinfra@vsnl.com		
India	L&T Infocity, Hyderabad			0091-40-23110217/8/9	0091-40-23110216			http://www.ltinfocity.com/home.htm
India	Shapoorji Pallonji Biotech Park Pvt Ltd.	Dhawan SURESH				info@spbiotechpark.com		
India	Software Technology Park , Hyderabad	Mr.B.V.Naidu	Director	-23100449	-23100450	bv.naidu@blr.stpi.in	Software Technology Parks of India, 6Q3, 6th floor, Cyber Towers, Hitec City, Madhapur, Hyderabad - 500 033, INDIA	www.hyd.stpi.in
India	Software Technology Park , Hyderabad	Mr.B.V.Naidu	Director	-23100449	-23100450	nfo@hyd.stpi.in	Software Technology Parks of India, 6Q3, 6th floor, Cyber Towers, Hitec City, Madhapur, Hyderabad - 500 033, INDIA	www.hyd.stpi.in
India	Software Technology Park Ltd, Bangalore			+91-80-28526115, 28520959 to 963	+91-80-28520958, 28521161	bdg@blr.stpi.in		http://www.blr.stpi.in
India	STPI-BANGALORE	Mr. B.V.Naidu	Director	91-80-28520444, 28526115,		bv.naidu@blr.stpi.in	Software Technology Parks of India,Block III, KSSIDC Complex, Electronics City Hosur Road, Bangalore - 560 100, Karnataka, INDIA.	
Iran	Arak Science & Technology Park	Mohammad Reza Sangi				info@astp.ir		
Iran	East Azarbaijan Science and Technology Park	Abdolreza MIRMOHSENI				mirmohseni@trabizu.ac.ir		
Iran	Fars Science and Technology Park - FSTP	Ahmad BEHGOZIN				info@fstp.ir		
Iran	Guilan Science and Technology Park (GSTP)	Majid MOTTAGHITALAB				info@gstp.ir		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Iran	Iran Industrial Estates Co.	Mohamad Razavi				Mrazavi@Iranindustry.org		
Iran	Isfahan Science & Technology Town	Mozhgan YAZDIAN				international.affairs@istt.org		
Iran	Isfahan Science & Technology Town			(98)311 3913900-6	(98) 311 3913913	international.affairs@istt.org	P.O.Box: 84155/666, Isfahan Univercity Of Technology Blvd, Isfahan84154,Iran	
Iran	Khorasan Science and Technology Park - KSTP	Amir MALEKZADEH				info@kstp.ir		
Iran	Pardis Technology Park	Mahdi SAFARINIA				info@techpark.ir		
Iran	Rooyesh IT Incubator	Ramin NAVVABPOUR				info@itincubator.com		
Iran	Science & Technology Park of Tehran University	Abdolmajid ESKANDARI				eskandar@ut.ac.ir		
Iran	Semnan Science & Technology Park	Ali Dastfan				dastfan@irost.com		
Iran	Shahid-Beheshty University Science Park	Ali ALAI				Admission@cc.sbu.ac.ir		
Iran	Yazd Science and Technology Park (YSTP)	Mohammad Saleh Owlia				info@ystp.org		
Ireland	Campus Industry Programme Office, Shannon Development	Kelly N		353 61 410 777	353 61 315 634	kellyn@shannondev.ie	Campus Industry Programme Office, Shannon Development, The Granary, Michael Street, Limerick.	
Ireland	Davy Hickey Properties			353 1) 679 5222	353 1) 679 6377	gen@davy-hickey.ie	27 Dawson Street, Dublin 2,	
Ireland	EEOLAS RESEARCH CAMPUS (http://www.eeolas.dcu.ie/)			353 1 7005769	353 1 700 5888	info@eeolas.dcu.ie	3013 Lake Drive Citywest Business Campus D24	
Ireland	GROWCORP INNOVATION CENTRE (www.growcorp.net)			(01) 466 1000	(01) 466 1002	grow@growcorp.net	3015 Lake Drive, Citywest Business Campus Park, Dublin 24	
Ireland	Innovation works			353 61 503203	353 61 338065	business@shannondev.ie	InnovationWorks,National technology Park, Limerick, Ireland.	
Ireland	Innovation Works	Ms Ina Reddan		00353 61 361 708	00353 61 361 759	reddani@shannondev.ie	National Technology Park, Limerick, Ireland.	
Ireland	Jones Lang LaSalle			353 1) 673 1600	353 1) 679 5147	info.ie@eu.joneslanglasalle.com	10/11 Molesworth Street, Dublin 2,	
Ireland	Shannon Development	John Ruddle	Shannon Heritage	061-361511	353 (0)61 361903	ruddlej@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Ireland	Shannon Development	Pat Daly	Limerick	061-410777		dalyp@shannondev.ie	Shannon Development, Limerick Office, The Granary, Michael Street, Limerick, Ireland	
Ireland	Shannon Development	Frank Larkin	Communications	061-710262	353 (0)61 361903	larkinf@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	David Hogan	Planning	061-710332	353 (0)61 361903	hogand@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Sean Fitzgibbon	Company Secretary & Corporate Development Director	061-710204	353 (0)61 361903	fitzgibbons@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Brian Callanan	Research & Development	061-710227	353 (0)61 361903	callananb@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	John Quinlivan	Clare	065-6895000		quinlivanj@shannondev.ie	Shannon Development, Ennis Office, Information Age Park, Ennis, Co. Clare, Ireland	
Ireland	Shannon Development	Brendan Lynch	Product Development & Strategic Policy Initiatives	061-710274	353 (0)61 361903	lynchb@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Paul Deegan	Web Master	061-710477	353 (0)61 361903	deeganp@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Neil O'sullivan	Irish Enterprise	061-410777	353 (0)61 361903	osullivann@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Tomas O'domhnaill	Tipperary N.R./South West Offaly	067-32100		odomhnaillt@shannondev.ie	Shannon Development, Nenagh Office, Silverline Building, Connolly Street, Nenagh, Co. Tipperary, Ireland	
Ireland	Shannon Development	Alice Morgan	Knowledge Development	061-503038	353 (0)61 361903	morgana@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Ireland	Shannon Development	Olivia Loughnane	Research & Development Director	061-710465	353 (0)61 361903	loughnaneo@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	John Dillon	New Enterprise Development	061-503204	353 (0)61 361903	dillonj@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Martin Mckeogh	Spatial Development Director	061-710279	353 (0)61 361903	mckeoghm@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Ogie Moran	North Kerry	066-7190000		morano@shannondev.ie	Shannon Development, Tralee Office, Kerry Technology Park, Tralee, Co. Kerry, Ireland	
Ireland	Shannon Development	John King	Heritage & Tourism Director	061-710235	353 (0)61 361903	kingj@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Brendan Mckenna	Property Facilities	061-710385	353 (0)61 361903	mckennab@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Karl Mellon	West Coast	408 - 294 - 9083 and 408 - 294 - 8226		karlmellon@aol.com	Shannon Development,50 West San Fernando St, Suite 435, San Jose, CA 95113	
Ireland	Shannon Development	Kevin Thompstone	Chief Executive	353 (0)61 361555	353 (0)61 361903	keaned@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Michael Conacur	Property Administration	061-710248	353 (0)61 361903	conacurm@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Eugene Brennan	Knowledge Enterprise Director	061-710296	353 (0)61 361903	brennane@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	John Leonard	Regional Tourism / Innovation	061-710247	353 (0)61 361903	leonardj@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	
Ireland	Shannon Development	Gerry Fitzmaurice	Shannon Free Zone	061-710211	353 (0)61 361903	fitzmauriceg@shannondev.ie	Shannon Development,Town Centre, Shannon, Co. Clare, Ireland	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Ireland	Tipperary Technology Park			353 0504 29300	353 504 29305	TTP@Shannondev.ie	Tipperary Technology Park, Thurles Ireland.	
Ireland		L. J. Bannon		353-61-202632	353-61-202572	liam.bannon@ul.ie	University of Limerick, Limerick, Ireland	
Ireland		P. Byrne		353-61336555	353-61336545	byrnep@shannondev.ie	National Technological Park, Limerick, Ireland	
Italy	AREA Science Park	Gabriele GATTI				gabriele.gatti@area.trieste.it		
Italy	Centuria Science & Technology Park	Alessandro ZAMPAGNA				centuria-rit@centuria-rit.com		
Italy	Consorzio Ventuno - Parco Scientifico e Tecnologico della Sardegna	Francesco MARCHESCHI				polaris@c21.it		
Italy	Dipartimento di Scienze Economiche - Università degli Studi di Udine	Daniel PITTINO				pittino@dse.uniud.it		
Italy	Environment Park	Franco MANA				info@envipark.com		
Italy	Fondazione IDIS-Città della Scienza ONLUS	Vicenzo LIPARDI	General Director			lipardi@cittadellascienza.it		
Italy	Fondazione Parco Tecnologico Padano	Luigi TARENZI	General Manager, CEO			luigi.tarenzi@libero.it		
Italy	INDUXIA srl	Alberto IORI				andrea.francese@pirellirealestate.com		
Italy	Istituto Promozione Industriale (IPI)	Simona MARZETTI				marzetti@ipi.it		
Italy	Parco Scientifico e Tecnologico della Sardegna	Avv. Pierto FRANCESCHI				info@sardegna.it		
Italy	Parco Scientifico e Tecnologico della Sicilia, S.C.P.A.	Antonino CATARA				info@pstsicilia.org		
Italy	Science Park RAF S.p.A.	Marco BACCANTI	General Manager			marco.baccanti@spr-r.it		
Italy	Servitec srl	Lucio SUSMEL	CEO			susmel@servitec.it		
Italy	Servitec srl	Riccardo GALLI	Scientific Consultant			galli@servitec.it		
Italy	Vega Venice Gateway for Science and Technology	Gabriele ZANETTO				gzanetto@unive.it		
Japan	Kansai Science City	Kenichi UEMURA				kri@inf.keihanna-plaza.co.jp		
Japan	Kyoto Research Park	Mr. Jeffrey Hensley	Foreign Relations	(81)(75) 315-8315	(81)(75) 322-5348	jeff@krp.co.jp	Shimogyo-ku , Kyoto600-8813, Japan	http://www.krp.co.jp/english/index.html
Japan	Kyoto Research Park*	Jeffery HENSLEY	International Business Development Manager			jeff@krp.co.jp		
Korea	Daedeok Science Town Management Office (DASTO)	Kim JEONG-SEOK				jskim@dasto.or.kr		
Korea	Gwangju Technopark	Jong-Seong Lee				manji@gjtp.or.kr		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Korea	gyeonggi Technopark			82-31-500-3000	82-31-500-3301	kay92677@gtp.or.kr	1271-11 Sa 1-dong, Sangnok-gu, Ansan, Gyeonggi-do, 426-901 Korea	
Korea	Gyeonggi Technopark	Taek Lyul Song				tsong@email.hanyang.ac.kr		
Korea	The Kyonggi Small Business Center (KSBC)	Jung-Kil Han				prman@ksbc.or.kr		
Kuwait	HRD International Enterprise Centre	Abid ISMAIL				abid@nrec.com.kw		
Latvia	Latvian Technological Center	Janis STABULNIEKS				ltc@latnet.lv		
Latvia	Latvian Technology Park	Peteris REIHMANIS				ltp@adm.rtu.lv		
Lithuania	Visoriai Information Technology Park	Arunas SALANAUSKAS				asalanauskas@yahoo.com		
Luxembourg	Centre de Recherche Public Henri Tudor / Technoport Schlassgoart (BIC)	Claude WEHENKEL				claude.wehenkel@tudor.lu		
Luxembourg	Luxinnovation GIE	Gilles SCHLESSER				gilles.schlesser@luxinnovation.lu		
Malaysia	Kulim Technology Park Corporation Berhad	Ahmad Shukri Tajuddin				shukri@khtp.com.my		
Malaysia	Malaysian Technology Development Corporation			603 2161 2000	603 2163 7542	comms@mtdc.com.my	Level 3-4, MIDF Building, 195A, Jalan Tun Razak, 50400 Kuala Lumpur	
Malaysia	Multimedia Development Corporation (MDC)	Kathy Ng Yin Loo				info@mdc.com.my		
Malaysia	Multimedia Super Corridor	Dr Abu Talib Bin Bachik				abutalib@mdc.com.my	63000 Cyberjaya	
Malaysia	Technology Park Malaysia	Adeline Lum	Assistant Manager, communications department	603 8998 2391		adeline@tpm.com.my		
Malaysia	Technology Park Malaysia Corporation Sdn Bhd	Dr. Mohamed Salleh Ismail	President/CEO	603-8998-1998	603-8998-1996	drsalleh@tpm.com.my	Kuala Lumpur 57000, Malaysia	www.tpm.com.my
Malaysia	Technology Park Malaysia Corporation Sdn. Bhd.	Mohamad Salleh Ismail				query@tpm.com.my		
Malaysia	TH-NSTC SDN BHD (ENSTEK)	Mahmud ABBAS				hamzah@th-properties.com		
Mexico	Centro Incubador del Estado de Hidalgo	Marivel SOLIS BECERRA				humtsi@uaeh.reduaeh.mx		
Mexico	Instituto de Innovacion Y Transferencia de Tecnologia	Reynold Gonzalez Lozano		011 52 81 20209220	011 52 81 20209220	reynold.gonzalez@mtycic.com.mx	Monterrey , NL64060, Mexico	www.mtycic.com.mx
Mexico	Instituto Tecnológico y de Estudios Superiores de Monterrey, Campus Ciudad de México	Alfonso PARRA RODRIGUEZ				gparra@campus.ccm.itesm.mx		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Mongolia	Mongolian Association of Business Incubation and Science/Technology Park	B. Kh. Zuuturag				mabisp@mongolnet.mn		
New Zealand	AUT Technology Park	Mr. Jonathan Kirkpatrick	CEO	+64 9 917 9507	64 9 917 9501	jonathan.kirkpatrick@aut.ac.nz	Penrose , Auckland1135, New Zealand	www.aut.ac.nz
New Zealand	Massey University	Mr. Greg Smale		64 9 4442053	64 9 4430044	greg@newline.co.nz	Auckland New Zealand	www.massey.ac.nz
New Zealand	Massey University Albany Campus	John Raine	Duty Vice-Chancellor - Auckland	64 9 414 0822	64 9 414 0814	j.raine@massey.ac.nz	North Shore MSC , Auckland New Zealand	www.massey.ac.nz
Nigeria	Akwa Ibom Science and Technology Park	Linus ASUQUO				sctech@akwaibomstategov.com		
Northern Ireland	Northern Ireland Science Park (www.nisp.co.uk)	Michael Graham		028 9073 7800	028 9073 7801	info@nisp.co.uk	Queens Road, Queens Island, Belfast, Northern Ireland, BT3 9DT	
Northern Ireland	University of Ulster Science Research Parks (www.uusrp.com)	Sean Mccaul		028 7129 5901	028 7129 5900	sean.mccaul@uusrp.com	Technology & Software Innovation Centre, Science Research Park, Magee Campus, University of Ulster, Northland Road, Derry, BT48 7LJ	
Norway	Forskningsparken As	Kjell HAUGEN				information@fposlo.no		
Norway	IT Fornebu AS	Knut FRAEKELAND	Vice-President			knf@itfi.no		
Norway	Sarsia Innovation AS	Hans HEKLAND				Hans.Hekland@sarsia.com		
Norway	Siva-The Industrial Development Corporation of Norway	Harald KJELSTAD				siva@siva.no		
Oman	Knowledge Oasis Muscat (KOM)	Dave PENDER	Marketing Advisor			info@kom.com.om		
Panama	TECNOPARQUE INTERNACIONAL DE PANAMA	Alberto NAVARRO-BRIN				anavarro@cdspanama.org		
Panama	Universidad Tecnológica de Panamá	Gregorio URRIOLA-CANDANEDO				utp@ac.pa		
Philippines	Laguna Techno Park			(632) 818.3840	(632) 812.1386	info@lagunatechnopark.com.ph	Laguna Technopark, Inc.2/F Administration Building I, North Main Avenue, Laguna Technopark, Biñan, Laguna, Philippines	
Poland	Krakow Technology Park	Mateusz GORSKI	Marketing consultant			biuro@sse.krakow.pl		
Poland	Poznan Science and Technology Park, Adam Mickiewicz University Foundation	Berenika M. MARCINIEC	Project Manager			bm@ppnt.poznan.pl		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Portugal	Associaçao do Parque de Ciencia e Tecnologia do Porto - APCT-P	Candida LOUREIRO				pct.porto@mail.telepac.pt		
Portugal	Associação Parque de Ciência e Tecnologia Almada/Setúbal - Madan Parque	Alcino PASCOAL	Managing Director			info@madanparque.pt		
Portugal	Lispolis-Polo Tecnologico de Lisboa	Cândido Dos Santos				geral@lispolis.pt		
Portugal	Parque Tecnologico da Mutela /Almada	Mário DONAS	President			ptma@margueira.pt		
Portugal	Pólo Científico e Tecnológico da Madeira, Madeira Tecnopolo, S.A.	Raul CAIRES				admin@madeiratecnopolo.pt		
Portugal	Taguspark-Lisboa Science & Technology Park	Vasco VARELA	Park Director			vvarela@taguspark.pt		
Portugal	TECNOPARQUES - Associaçao Portuguesa de Parques de Ciência e Tecnologia	Luis MALTEZ				tecnparques@tecparques.pt		
Russia	JSC "VNIIEF-Conversia"	Vladimir I. ZHIGALOV				conv@vconvers.sar.ru		
Saudi Arabia	Makkah Science Park	Mohammed A. TAWFIQ				info@sgs.org.sa		
Saudi Arabia	Prince Abdullah Bin Abdulaziz Science Park	Halim Hamid Redhwi	Chairman of Science Park (PASP) Committee			hhamid@kfupm.edu.sa		
Scotland	Aberdeen Science & Technology Park	Lorraine Wildblood	Asset Manager	01224 252 086		lorraine.wildbloof@scotent.co.uk	Scottish Enterprise Grampian, 27 Albyn Place, Aberdeen	
Scotland	Alba Technology Center	Jenny Honey	Communications Manager,			jenny.honey@albacentre.co.uk	Livingstone, West Lothian, EH54 7EG, Scotland	
Scotland	Alba Technology Center			01506 407000	01506 407001	enquiries@albacentre.co.uk	Livingstone, West Lothian, EH54 7EG, Scotland	http://www.albacentre.com/
Scotland	Alba Technology Center	Gary Colquhoun		01506 407000	01506 407001	Gary.Colquhoun@scotent.co.uk	Livingstone, West Lothian, EH54 7EG, Scotland	http://www.albacentre.com/
Scotland	Countrywide Porter Novelli	Anne Mcmunn		44 (0) 131 470 3400	44 (0)131 470 3444	anne.mcmunn@cpns.co.uk	Hanover House, 4 Hanover Street, Edinburgh EH2 2PJ,	
Scotland	Edinburgh Technopole	Ian Murphy	Director	0131 440 3510	0131 440 7949	ian@edinburghtechnopole.co.uk	Bush Estate, Edinburgh EH26 0PJ, Scotland	
Scotland	Edinburgh Technopole Park	Ian Murphy	Director	+44 (0)131 440 3510		ian@edinburghtechnopole.co.uk	The Technopole Centre, Bush Estate, EH26 0PJ	
Scotland	Elvingston Science Centre	Janice Simpson		01875 408 000	01875 408 001	janicesimpson@elvingston.freeseve.co.uk	East Lothian, Scotland EH33 1EH	
Scotland	Heriot-Watt University Research Park	Jim Coyle		0131 449 7070	0131 449 7076	j.w.coyle@hw.ac.uk	Riccarton, Edinburgh EH14 4AP	

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Scotland	Hillington Park Innovation Centre	Tom Ogilvie		0141 585 6300	0141 585 6301	tom.ogilvie@innovationcentre.org	1 Ainslie Road, Hillington, Glasgow, G52 1RU	
Scotland	Pentlands Science Park	George Walker		0131 445 5111	0131 445 6235	george.walker@pentlands.co.uk	Pentlands Science Park, Bush Loan, Penicuik, Midlothian EH26 0PZ	
Scotland	Roslin BioCentre	Jane Kennedy		0131 200 6402	0131 527 4361	jane.kennedy@roslin-biocentre.com	Roslin, Midlothian EH25 9PP	
Scotland	Scottish Enterprise Technology Park	Stephen Lewis		0845 272 0222	01355 272 777		New Lanarkshire House, Strathclyde Business Park, Bellshill ML4 3AD	
Scotland	Stirling University Innovation Park	Sandie Mcgee	Innovation Park Manager	01786 448 333	01786 458 033	sandie.mcgee@suip.co.uk	SUIP Ltd, Unit 4, Scion House, Stirling University Innovation Park, Stirling, Scotland FK9 4NF	
Scotland	The Scottish Embedded Software Centre					microelectronics@scotent.co.uk		
Scotland	The Scottish Embedded Software Centre		Telecoms/Automotive	01506 407006		douglas.hyslop@scotent.co.uk		
Scotland	Tweed Horizons	Centre Manager		01835 822 922	01835 822 991	enquiries@tweedhorizons.co.uk	Newton St. Boswells Melrose Scottish Borders TD6 0SG	
Scotland	West of Scotland Science Park	Paul Cusack		0141 946 7161	0141 945 1591	pcusack@wssp.co.uk	West of Scotland Science Park, Glasgow G20 0SP	
Scotland	www.gvagrimley.co.uk	Jonny Mcmanus				jonathan.mcmanus@gvagrimley.co.uk	GVA Grimley,34 Melville Street, Edinburgh, Midlothian, EH3 7HA	
Scotland	www.gvagrimley.co.uk	Toby Withall		0131 225 7137	0131 220 1798	toby.withall@gvagrimley.co.uk	GVA Grimley,34 Melville Street, Edinburgh, Midlothian, EH3 7HA	
Scotland	www.joneslanglasalle.co.uk			0131 225 8344	0131 225 2147	hunter.booth@eu.jll.com	Jones Lang LaSalle, Lismore House, 127 George Street, Edinburgh, EH2 4JN	
Scotland	www.joneslanglasalle.co.uk			0131 225 8344	0131 225 2147	cameron.stott@eu.jll.com	Jones Lang LaSalle, Lismore House, 127 George Street, Edinburgh, EH2 4JN	
Singapore	Singapore Science Park Ltd	Mun Hou Chew	Asst. Vice President			munhou.chew@ascendas.com		
Singapore	Singapre Science Park	Sarah Wong		(65) 6774 9026	Fax (65) 6778 4761	sarah.wong@ascendas.com	75 Science Park Drive, #01-03 CINTECH II, Singapore Science Park I, Singapore 118255	
Slovenia	Technološki Park Ljubljana	*Iztok Lesjak Msc*				*info@tp-lj.si*		
South Africa	Technikon Free State Science Park	Deon J. DE BEER				ddebeer@tfs.ac.za		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
South Africa	The Innovation Hub	Neville COMINS	CEO			ncomins@innovationhub.co.za		
Spain	AERÓPOLIS, Parque Tecnológico Aeroespacial de Andalucía					aeropolis@aeropolis-andalucia.com		
Spain	Agencia Navarra de Innovación y Tecnología, S.A.	Javier GASTESI				agencia@anain.com		
Spain	Albacete Science & Technology Park					pcyta@pcyta.com		http://www.pcyta.com/
Spain	Albacete Science and Technology Park	Pascual Gonzale-Lope	General Manager	34 967 59 9200x2235	34 967 59 9233	pcyta@pcyta.com	Albacete Spain	www.pcyta.com
Spain	Bilbao Technology Park	Mauri Lazkano	Chairman	34-94-4039500	34-94-4039510	info@parque-tecnologico.net	Zamudio , Bizkaia48170, Spain	www.parque-tecnologico.net
Spain	GEOLIT, Parque Científico-Tecnológico del Aceite y el Olivar, S.A.	Jesús Alfonso Muñoz Jiménez				geolit@geolit.es		
Spain	IASP	Mari Carmen González	Senior Secretary			seniorsec@iasp.ws		
Spain	IASP	Prof. Manuel CASTELLS	Advisory Council			iasp@iasp.ws		
Spain	IASP	Luis SANZ	Director General			iasp@iasp.ws		
Spain	IASP	Prof. Jay MITRA	Advisory Council			jaymitrauniverse@hotmail.com		
Spain	IASP	Ebba LUND	Services Manager			servicesmanager@iasp.ws		
Spain	MEDPARK / Mediterranean Science Park / University of Alicante	Antonio MARCILLA GOMIS				vr.investi@ua.es		
Spain	Parc Científic de Barcelona	Joan BELLAVISTA				jbellavista@pcb.ub.es		
Spain	Parc Científic i Tecnològic de la UAB	Sonia GONZALEZ GARCIA	Biocampus Managing and Promotion			sgonzalez@uab.es		
Spain	Parc Científic i Tecnològic de la Universitat de Girona	Tomás SOBREQUÉS				unigiparc@udg.es		
Spain	Parc d´innovació Tecnològica i Empresarial La Salle	Daniel CABEDO I PUY				parc@salleURL.edu		
Spain	Parc Tecnològic del Vallès, S.A.	Xavier GARRIGA	Assistant to General Manager			xgarriga@ptv.es		
Spain	ParcBit - Balearic Innovation Technology Park	Antonio REUS				general@parcbit.caib.es		
Spain	Parque Agroalimentario de Cártama, S.A.	Jorge GALLARDO				upecartama@wanadoo.es		
Spain	Parque de Innovación y Tecnología de Almería, S.A.	Alfredo SÁNCHEZ	General Manager			asanchez@pitalmeria.es		

Country	Park Name	Contact Name	Position/Title	Telephone	Fax	E-Mail	Address	Web-Site
Spain	Parque Tecnológico de Álava-Arabako Teknologi Parkea, S.A.	Manuel ARRIETA AMANN	General Manager			marrieta@pt-alava.es		
Spain	Parque Tecnológico de Andalucía	Felipe Romera	General Manager			fromera@pta.es		
Spain	Parque Tecnológico de Andalucía	Luis VALVERDE	Financial Director			lvalverde@pta.es		
Spain	Parque Tecnológico de Asturias	Sonia VERDE				sonia@idepa.es		
Spain	Parque Tecnológico de Bilbao	Mauri LAZKANO	President			mauri.lazkano@parque-tecnologico.net		
Spain	Parque Tecnológico de Bilbao	Julián SANCHEZ	General Manager			julian.sanchez@parque-tecnologico.net		
Spain	Parque Tecnológico de Galicia	Miguel Angel Perez				ptg@ptg.es		
Spain	Parque Tecnológico de Galicia	Miguel Ángel Pérez Pérez	CEO			tecnopole@tecnopole.es		
Spain	Parques Tecnológicos de Castilla y León, S.A.	Gerardo ARIAS TEJERINA				ptb@cict.jcyl.es		
Spain	Parques Tecnológicos de Castilla y León, S.A.	Myriam GARCÍA	External Affairs			garmazmy@jcyl.es		
Spain	Polo de Innovación Garaia, S.A.	Andoni GARCIA URTAZA	Manager Director			garaia@pologaraia.es		
Spain	San Sebastian Technology Park	Joakin TELLERIA AGIRREZABALA				miramon@miramon.es		
Spain	Science and Technology Park of Gijón	Emilio GUMIEL BEGANTIÑOS	Director			Pctg@telecable.es		
Spain	Walqa Technology Park	Rafael SANCHEZ TOVAR	I.A.F. Infraestructures Manager			rsanchez@iaf.es		
Sweden	Mjärdevi Science Park	Sten Gunnar Johansson	CEO			sg.johansson@mjardevi.se		
Sweden	UMINOVA Science Park	Jan OLSSON	Director			Jan.Olsson@uminovainnovation.se		
Sweden	Chalmers Science Park	Lars JACOBSON				lars.jacobson@cit.chalmers.se		
Sweden	Ideon Science Park	Ewa LUNDH				ewa.lundh@center.ideon.se		
Sweden	Karolinska Science Park	Folke MEIJER				Folke.Meijer@kab.ki.se		
Sweden	Kista Science City AB	Per Anders Hedkvist				peranders.hedkvist@kista.com		
Sweden	Mjärdevi Science Park	Helene Akesson	Administrator			helene.akesson@mjardevi.se		
Sweden	Novum Research Park	Anders THORE	General Manager			ingemar.ahlandsberg@novum.se		
Sweden	Novum Research Park	Ingemar AHLANDSBERG				ingemar.ahlandsberg@novum.se		

Appendix
3

A3 Potential Investor Firms and Contacts

A3.1 North America

A3.1.1 Agribusiness

Firm Name / Address	Contact Name
The Dow Chemical Company 2030 Dow Center Midland, MI 48674 USA Phone: 800-422-8193 (U.S. and Canada) 989-636-1463 Fax: 989-636-1830 http://www.dow.com	**Phillip H. Cook** Corporate Vice President, Strategic Development and New Ventures
Monsanto Company 800 North Lindbergh Boulevard St. Louis, MO-63167 314-694-1000 http://www.monsanto.com	**Robert T. Fraley, Ph.D.** Executive Vice President and Chief Technology Officer
	Brett D. Begemann Executive Vice President, International Commercial
	Cheryl Morley Senior Vice President, Corporate Strategy
	Brasil Offices (Sao Paulo) Monsanto do Brasil Ltda Avenida Nacoes Unidas, 12.901- 7 e 8 andares Torre Norte - Brooklin Novo Sao Paulo, Brazil CEP04578-910 Phone: 55 11 5503-2600 Fax: 55 11 5508-6999
Pioneer Hi-Bred International, Inc. Resource Connection PO Box 1000 Johnston IA 50131-0184 515-270-3200 Fax: 515-270-3581 http://www.pioneer.com	**Brazil Office** Pioneer Sementes Ltda. Santa Cruz do Sul BR 471 Km 49, Distrito Industrial Caixa Postal 1009 96810-970 Santa Cruz do Sul, RS Tel: (55) 51 3719-7700 Fax: (55) 51 3719-1140

A3.1.2 Alternative Energy

Firm Name / Address	Contact Name
Cargill, Inc. PO Box 9300 Minneapolis, MN 55440-9300 1-800-CARGILL (227-4455) http://www.cargill.com	**Christopher P. Mallett** Corporate Vice President, Research and Development
Imperial Western Products, Inc. PO Box 1765 Indio, CA 92202 86-600 Avenu 54 Coachella, CA 92236 800-975-6677 Fax: 760-398-0815 http://www.imperialwesternproducts.com	**Curtis Wright** Division Manager of Methyl Ester & Glycerin Production cwright@imperialwesternproducts.com
	Joseph Boyd Lab Manager jboyd@imperialwesternproducts.com
Pacific Biodiesel, Inc. 40 Hobron Avenue Kahului, Hawaii 96732 808-877-3144 Fax: 808-877-5030 http://www.biodiesel.com	**Kelly Takaya King** Communications/Marketing ktk@biodiesel.com
	General Information info@biodiesel.com
VeraSun Energy 100 22nd Ave., Suite 103 Brookings, SD 57006 605-696-7200 Fax: 605-696-7250 info@verasun.com http://www.verasun.com	**Matt Janes** Vice President, Technology
	Paul Schock Vice President Corporate Development

A3.1.3 Biotechnology / Pharmaceutical

Firm Name / Address	Contact Name
Abbott Laboratories 100 Abbott Park Rd. Abbott Park, Illinois 60064-3500 847-937-6100 http://abbott.com	**Richard Ashley** Executive Vice President, Corporate Development
	Holger Liepmann Senior Vice President, International Operations
	Brazil - Nutritionals and Pharmaceuticals Abbott Laboratórios do Brasil Ltda. Caixa Postal No. 21.111 04602-970 Sao Paulo, SP, Brazil Telephone: (55 11) 5536 7000 Facsimile: (55 11) 5536 7030 http://www.abbottbrasil.com.br
	Brazil - Diagnostics and Diabetes Care Abbott Diagnostics Caixa Postal No. 9808 01065-970 Sao Paulo, SP, Brazil Telephone: (55 11) 5536 7060 Facsimile: (55 11) 5536 7062 http://www.abbottbrasil.com.br
Allergan, Inc. P.O. Box 19534 Irvine CA 92623 USA 714-246-4500 Fax: 714-246-4971 http://www.allergan.com	**Scott M. Whitcup, M.D.** Executive Vice President, Research and Development
	Raymond H. Diradoorian Executive Vice President, Global Technical Operations
Amgen, Inc. One Amgen Center Drive Thousand Oaks, CA 91320-1799 USA 805-447-1000 http://www.amgen.com	**Dennis M Fenton, Ph.D.** Executive Vice President of Operations
Avian Biotech International 1336 Timberlane Road Tallahassee, FL 32312-1766 800-514-9672 Email: contact@avianbiotech.com http://www.avianbiotech.com	**Dr. Siwo R. de Kloet** Research Director, Animal Genetics siwo@avianbiotech.com
Genentech, Inc. 1 DNA Way South San Francisco, CA 94080 USA 650-25-1000 Fax: 650-225-6000 http://www.gene.com	**Frank Menkel** Strategic Planning 650-467-3306 (Direct) Mail-Stop 55

Firm Name / Address	Contact Name
Genzyme Corporation 500 Kendall Street Cambridge, MA 02142 USA 617-252-7500 Fax: 617-252-7600 http://www.genzyme.com	**Mark R Bamforth** Senior Vice President Corporate Operations and Pharmaceuticals
McKesson Corporation One Post Street San Francisco, CA 94104-5296 415-983-8300 http://www.mckesson.com	**Marc Owen** Executive Vice President, Corporate Strategy and Business Development

A3.1.4 Electric / Electro-mechanical / Electronic

Firm Name / Address	Contact Name
Agere Systems 1110 American Parkway NE Lehigh Valley Central Campus Allentown, PA 18109 800-372-2447 Fax: 610-712-4106 http://www.agere.com	**Andrew Micallef,** Executive Vice President, Global Operations
	Denis Regimbal, Executive Vice President and General Manager, Mobility Division
	Samir Samhouri, Executive Vice President and General Manager, Telecommunications and Enterprise Networking Division
	Ruediger Stroh, Executive Vice President and General Manager, Storage Division
Apple Computer, Inc 1 Infinite Loop Cupertino, CA 95014 408-996-1010 http://www.apple.com	**Katie Cotton** Vice President of Worldwide Corporate Communications katiec@apple.com
Cisco Systems, Inc. 170 West Tasman Dr. San Jose, CA 95134 USA 408-526-4000 800-553-NETS 800-553-6387 http://www.cisco.com	**Alberto Perez** Global Product Services Manager
	Luciany Hara Sales Representative of Cisco Brazil

Firm Name / Address	Contact Name
Cognizant Technology Solutions 500 Glenpointe Centre West Teaneck, NJ 07666 201-801-0233 Toll Free: 888-937-3277 Fax: 201-801-0243 inquiry@cognizant.com http://www.cognizant.com	**Francisco D'Souza** Chief Operating Officer
	Chandra Sekaran Executive Vice President & Managing Director
Dictaphone Corporation 3191 Broadbridge Avenue Stratford, CT, 06614-2559 USA 203-381-7000 http://www.dictaphone.com	**Donald Fallati** Executive Vice President Marketing & Strategic Planning dfal@dictaphone.com
Hewlett-Packard (HP) 3000 Hanover Street Palo Alto, CA 94304-1185 USA 650-857-1501 Fax: 650-857-5518 http://www.hp.com	**Shane Robison** Executive Vice President and Chief Strategy and Technology Officer
IBM Almaden Research Center 650 Harry Road San Jose, CA 95120 408-927-1000 http://www.ibm.com	**Mr. Andrew (Drew) Clark** Director of Strategy, IBM Corporate Venture Capital Group alclark@us.ibm.com Telephone: 1-650-926-6008
	Mr. Atul Chadha Manager, Worldwide Information Integration Technology Solutions achadha@us.ibm.com Telephone: 1-408-463-3706
	Ms. Jeanette Horan VP Worldwide Information Management Development, GM Silicon Valley Laboratory jeanette_horan@us.ibm.com Telephone: 1-408-463-3060
	Dr. Nelson Mattos Distinguished Engineer and VP Worldwide Information Integration mattos@us.ibm.com Telephone: 1-408-927-1950
Kryptiq Corporation 3600 NW John Olsen Place Suite 300 Hillsboro, Oregon 97124 503-906-6300 Toll Free: 1-888-KRYPTIQ (1-888-579-7847) Fax: 503-906-6301 http://www.kryptiq.com	**Sam Shapiro** Vice President Development and Operations

Firm Name / Address	Contact Name
Lenovo One Manhattan Ville Road Purchase, New York 10577-2100 USA 914-701-2800 http://www.lenovo.com	**Ravi Marwaha** Senior Vice President, Geographies
NCR 1700 S. Patterson Blvd Dayton, Ohio 45479 USA 1-800-CALL-NCR (1-800-225-5627) Outside the U.S.:1-937-445-1936 http://www.ncr.com	**John Hourigan** Corporate Media Relations john.hourigan@ncr.com
Sun Microsystems, Inc. 4150 Network Circle Santa Clara, CA 95054 USA Phone: US 1-800-555-9SUN International 1-650-960-1300 http://www.sun.com	**Mr. Marcos Café** Sales Director
	Piper Cole VP Public Policy
	Robert Bredehfy Sr. Director Global Government Sector
	Mr. Andre Echeverria Marketing Director of Sun in Brazil
	Mr. Cleber Morais Brazil Country Manager
	Steve Huff Manager, Global Government Strategic Sales
	Keith Tabacek Director Strategic Planning – Workplace Resources
	Allison Baker Senior Strategist – Global Product Engineering
Sybase, Inc. One Sybase Drive Dublin, CA 94568 1-800-8SYBASE 1-925-236-5000 http://www.sybase.com	**Marty Beard** Senior Vice President - Corporate Development & Marketing
	Mark Westover Vice President – Corporate Development
	David Tong Vice President - Engineering
Toshiba America, Inc. 1251 Avenue of the Americas Suite 4110 New York, NY 10020 http://www.toshiba.com	**Yuji Kiyokawa** Corporate Executive VP

Firm Name / Address	Contact Name
Xiotech Corporation 6455 Flying Cloud Drive Eden Prairie, MN 55344 866-472-6764 http://www.xiotech.com	**Karl D. Schubert** Vice President & Chief Technology Officer

A3.1.5 Food Technology

Firm Name / Address	Contact Name
Agricore United - Winnipeg TD Centre 201 Portage Avenue P. O. Box 6600 Winnipeg, Manitoba R3C 3K7 204-944-5411 Fax: 204-944-5454 infomaster@agricoreunited.com www.agricoreunited.com	**John Dean** International Market Development
Alltech, Inc. Global Foods Division 3031 Catnip Hill Pike Nicholasville, KY 40356 859-885-9613 Fax: 859-887-3256 Email globalfoods@alltech.com Web http://www.alltech.com	**Dr. Karl Dawson** Global Director of Research
	Dr. Kate Jacques Director of Nutrition
	Alltech do Brasil Agroindustrial Ltda Rua Said Mohamad El Khatib, 280 Cep: 81170-610 Curitiba-PR CIC - Curitiba - Paraná Brasil Fone: 55 (41) 3347-9291 Fax: 55 (41) 3347-9894 Mr. Guilherme Minozzo Director gminozzo@alltech.com www.alltech.com/brasil

Firm Name / Address	Contact Name
Archer Daniels Midland Company 4666 Faries Parkway Decatur, IL 62526 800-637-5843 http://www.admworld.com	**Edward A. Harjehausen** Senior Vice President (Food and Feed Ingredients)
	J. Kevin Burgard Vice President (Specialty Food Ingredients)
	Matthew J. Jansen Vice President (South American Operations)
	Ismael Roig Vice President (Planning and Business Development)
	ADM do Brasil Ltda Av Roque Petroni Jr, 999 – 4o.andar Jd das Acácias – São Paulo – SP, Brasil, 04707-000 Telefone: +55 11 5185 3500 Fax: +55 11 5182 3502
ConAgra Foods Inc. One ConAgra Drive Omaha, NE 68102-5001 402-595-4000 http://www.conagrafoods.com	**James G. Doyle** Vice President, Real Estate
	Dr. Patricia Verduin Senior Vice President
	Corey Berends Vice President, Product Development (Consumer Products)
	Laura Donahue Vice President, Product Development (Commercial Products), and Culinary Center of Excellence
Martek Biosciences Corporation 6480 Dobbin Road Columbia, MD 21045 410-740-0081 Fax: 410-740-2985 contactus@martekbio.com http://www.martekbio.com	**James H. Flatt** Senior Vice President, Research and Development
	David Abramson Senior Vice President, Business Development
Thomson Scientific 3501 Market Street Philadelphia, PA 19104 USA 800-336-4474 215-386-0100 Fax: 215-386-2911 http://scientific.thomson.com	**Steve Quinn** Senior Vice President, Business Process

A3.1.6 Healthcare

Firm Name / Address	Contact Name
Nektar Therapeutics 150 Industrial Road San Carlos, CA 94070 650-631-3100 Fax: 650-631-3150 nektar@nektar.com http://www.nektar.com	**Hoyoung Huh, M.D., Ph.D.** Senior Vice President, Business Development and Marketing
	David Johnston Senior Vice President, Research & Development
	Christopher J. Searcy, Pharm.D. Vice President, Corporate Development
Baxter International Inc. One Baxter Parkway Deerfield, IL 60015-4625 847-948-2000 http://www.baxter.com	**Norbert Riedel, Ph.D.** Corporate Vice President and Chief Scientific Officer
Boston Scientific Corporation One Boston Scientific Place Natick, MA 01760-1537 USA http://www.bostonscientific.com	**Stephen F. Moreci** Senior VP & Group President, Endosurgery
	Jeff H. Goodman Senior Vice President, & President International
Contech Medical, Inc. 99 Hartford Avenue Providence, RI 02909 USA 401-351-4890 Fax: 401-421-5072 http://www.contech-medical.com	**Bob DiPetrillo** Vice-President bdipetrillo@contechmedicalusa.com

A3.1.7 Open Source

Firm Name / Address	Contact Name
SugarCRM Inc. 10050 North Wolfe Road SW2-130 Cupertino, CA 95014 USA 408-454-6900 Fax: 408-873-2872 http://www.sugarcrm.com	**Jacob Taylor** Chief Technology Officer & Co-Founder
	Yun-Ping Hsu Vice President of Engineering
Socialtext 655 High Street Palo Alto, CA 94301 USA 650-323-0800 Fax: 650-323-0801 http://www.socialtext.com	**Ross Mayfield** Chief Executive Officer, Founder
	Peter Kaminski Chief Technology Officer, Founder

Firm Name / Address	Contact Name
MySQL Inc. Cupertino City Center 20400 Stevens Creek Boulevard Suite 700 Cupertino, CA 95014 USA 408-213-6600 Fax: 408-213-2807 http://www.mysql.com	**Michael Widenius** CTO and Co-founder
	Kaj Arno Vice President of Open Source Community Relations
	Maurizio Gianola Vice president, Software Engineering
Red Hat, Inc. 1801 Varsity Drive Raleigh, NC 27606 USA 919-754-3700 Fax: 919-754-3701 http://www.redhat.com	**Paul Cormier** Executive Vice President, Engineering
	Mary Sutton Senior Vice President - Human Capital

A3.1.8 Semiconductor

Firm Name / Address	Contact Name
Broadcom Corporation 16215 Alton Parkway Irvine, CA 92618 USA 949-450-8700 http://www.broadcom.com	**Vahid Manian** Senior Vice President Global Manufacturing Operations
Filtran Microcircuits 2475 Don Reid Drive Ottawa, Ontario, Canada, K1H 1E2 613-737-0706 Fax: 613-737-0495 e-mail: fmi@filtranmicro.com http://www.filtranmicro.com	**Denis Duhaime** General Manager
Intel Corporation 2200 Mission College Blvd. Santa Clara, CA 95052 USA 408-765-8080 http://www.intel.com	**Howard High** Strategic communications Manager
	Chuck Pawlak Director, Corporate Real Estate Member, Site Selection Committee
Lam Research Corporation Corporate Headquarters 4650 Cushing Parkway Fremont, CA. 94538 USA 510-572-0200 http://www.lamrc.com	**Ernest E Maddock** VP of Global Operations

Firm Name / Address	Contact Name
Xilinx, Inc. 2100 Logic Drive San Jose, CA. 95124-3400 USA 408-559-7778 http://www.xilinx.com	**Boon C. Ooi** Vice President of Worldwide Operations
	Lisa Washington Worldwide Public Relations Corporate & Executive Programs phone: (408) 626-6272 fax: (408) 371-4926 email: lisa.washington@xilinx.com

A3.1.9 Sports

Firm Name / Address	Contact Name
Nike Corporation One Bowerman Drive Beaverton, OR 97005-6453 USA 800-344-6453 http://www.nike.com	**Jim Allaker** Vice President EMEA Finance, Operations and Strategic Planning

A3.1.10 Telecommunications/ Data Communications

Firm Name / Address	Contact Name
Agilent Technologies, Inc. 395 Page Mill Rd. Palo Alto, CA 94306 United States 877-424-4536 650-752-5000 alternate phone Fax: 650-752-5300 http://www.agilent.com	**Darlene J. Solomon** Vice President and Director Agilent Laboratories
	Jack P. Trautman President, Semiconductor Test Solutions Senior Vice President, Agilent Technologies, Inc.
Alcatel 600 March road Ottawa, Ontario K2k E26 613-591- 6000 http://www.alcatel.com	**Geoff Cowan** Executive Vice President, Sales
Ciena Corporation 1201 Winterson Road Linthicum, MD 21090 United States 410-694-5700 Fax: 410-694-5750 http://www.ciena.com	**James Frodsham** Senior Vice President, Corporate Development
	Stephen B. Alexander Chief Technology Officer; Senior Vice President, Products and Technology
	William R. Koss Vice President, Global Business Partners and Alliances

A3.1.11 Other

Firm Name / Address	Contact Name
Adhesives Research, Inc. 400 Seaks Run Road P.O. Box 100 Glen Rock, PA 17327 717-235-7979 800-445-6240 Fax: 717-235-8320 http://www.adhesivesresearch.com	**Geoff Bennett** Vice President & General Manager ARcare® Division gbennett@arglobal.com
	Bill Stratton Vice President & General Manager ARclad® Division bstratton@arglobal.com
	Beth Vondrak Vice President & General Manager ARx™ Division bvondrak@arglobal.com
	John Lind, Ph.D. Vice President Technology and Systems jlind@arglobal.com
Eastman Kodak Company 343 State Street Rochester, NY 14650 USA 585-721-5143 http://www.kodak.com	**Mary Burkhardt** Director, Global Sites and Kodak Rochester Operations and Vice President

A3.2 Asia / Africa

A3.2.1 Agribusiness

Firm Name / Address	Contact Name
Agrimm Technologies 403 Peterborough St Christchurch, New Zealand 64-3-325-3311 Fax: 64-3-325-6117 http://www.tricho.com	**David Gale**
Changshu Alliance Chemical Heshi Town, Changshu City Jiangsu Province, China 86-512-52541419 Fax: 86-512-52541166 http://www.lb88.com	**Su Huizhong**
	Chen Jianyun

Firm Name / Address	Contact Name
Manipal AcuNova Ltd Mobius Towers, SJR i-Park EPIP, Whitefield Bangalore India 560 037 91-80-5691-5700 Fax: 91-80-5691-5719 www.acunovalife.com	**Mr. Kal Chatto** Chief Executive Officer kalchatto@acunovalife.com **Dr. Ramananda S. Nadig** Chief Operating Officer ramananda.nadig@acunovalife.com
Pacific Agriscience 24C Duxton Hill, Singapore 089607 65-6222-9753 Fax: 65-6223-3009 http://www.pacificagriscience.com	**cs@pacificagriscience.com**
Summit Agro International Harumi Island Triton Square Office Tower Z 1-8-12, Harumi, Chuo-ku, Tokyo, Japan 104-6223 03-6221-3000 Fax: 03-6221-3005 http://www.summit-agro.co.jp	

A3.1.2 Alternative Energy

Firm Name / Address	Contact Name
Beijing Fuyyan Century Fuel Cell Power Ltd (FCFCP) No. 15 Yuncheng Street Beijing Economic Technological Development Area 100176 China 86-10-8830-2679 www.fyfuelcell.com	
Bhagwan Energy Solutions A-7, Prithvi Kaliamman Koil Street Virugambakkam, Chennai 600092 India 91-44-23771566	**SL Sriram**
Kirloskar Oil Eng. Ltd L Kirloskar Road, Kirkee Pune, India 411003 91-20-2552-0250	**Arvind Kirloskar**
Kobelco Eco-Solutions Co. Ltd 9-12, 5-chome, Kitashinagawa Shinagawa-ku Tokyo, 141-8688, Japab 81-3-5739-5800 www.kobelco-eco.co.jp	

A3.2.3 Electric / Electro-mechanical / Electronic

Firm Name / Address	Contact Name
Ace Asia Co Ltd. 2F-1, No. 1, Lane 92 Yung Ho Road, Sec. 2Yung Ho City Taipei Taiwan 234 886-2-29233859 Fax: 886-2-29233860 http://www.aceasia.com	**Ms. Margaret Hsieh** Marketing Director
D-Link Corporation 2F, No. 233-2 Pao-Chiao Rd., Hsin Tien Shih Taipei, Taiwan 231 866-2-2916-1600 1-866-743-4664 http://www.dlink.com/	**Yvonne Yan** Vice President- Investor Relations & Corporate Communications
Globalsat Technology Corporation 16F, No. 186 Jian Yi Road Chung Ho City Taipei, Taiwan 235 886-2-82263799 Fax: 886-2-82263899 http://www.globalsat.com.tw	**Mrs. Virginia Wu** Sales & Marketing Director
Tronic International Pte Ltd Blk 1091 Lower Delta Road #02-02 Tiong Bahru Ind. Estate Singapore Singapore 169202 65-62769077 Fax: 65-62760991 http://www.tronic.com.sg	**Mr Derek Phua** Sales Director derek.phua@tronic.com.sg

A3.2.4 Food Technology

Firm Name / Address	Contact Name
Ajinomoto 15-1, Kyobashi, 1-chome, Chuo-ku, Tokyo 104-8315 Japan 81(3)5250-8111 www.ajinomoto.com	

Firm Name / Address	Contact Name
Fontera Suite 615 125 Buitengracht Street Cape Town, 8001 South Africa 021-409-7945 Fax: 021-409-7946 www.fontera.com	
Tata Tea 1 Bishop Lefroy Road Calcutta 700 020 India www.tata.com	**Christabelle Noronha** Vice President media@tata.com

A3.2.5 Telecommunications/ Data Communications

Firm Name / Address	Contact Name
Ambit Microsystems Corporation 5F-1, 5 Hsin-An Rd. Hsinchu Science-Based Industrial Park Hsinchu City, Taiwan R.O.C. 011-886-577-5100 http://www.ambit.com.tw	**Steve Chang** steven.chang@ambit.com.tw
Sercomm, Inc. 8F, Bldg G,No.3-1, YuanQu St. NanKang, Taipei 115, Taiwan, R.O.C. 115 (NanKang Software Industry Park) 011- 886-2-2655-3988 Fax: 011- 886-2-2655-3966 http://www.sercomm.com.tw	**Ben Lin** ben_lin@sercomm.com

A3.3 Europe

A3.3.1 Biotechnology / Pharmaceutical

Firm Name / Address	Contact Name
BioRegio Stern GmbH Friedrichstraße 10 D-70174 Stuttgart 49-711-870354-0 Fax: 49-711-870354-44 http://www.bioregio-stern.de	**Klaus Eichenberg, Dr. rer. nat.** Managing Director eichenberg@bioregio-stern.de 49-711-870354-22

Firm Name / Address	Contact Name
Biotissue Technologies GmbH Engesserstraße 4b D-79108 Freiburg 49-0-761-76-76-100 Fax: 49-0-761-76-76-150 http://www.biotissue-tec.com	**Dr. Victor Tiegermann** **Dr. med. Eszter Tánczos**
Charite Tissue Engineering Charité University Medicine Tucholskystr. 2 10117 Berlin 0049-30-450513198 Fax: 0049-30-450513943 http://www.charite.de	**Michael Sittinger, PhD Biology** Head of the Laboratory for Tissue Engineering michael.sittinger@charite.de 0049-030-450-513-198
MINUCELLS and MINUTISSUE Vertriebs GmbH Starenstrasse 2 D-93077 Bad Abbach Germany 49-0-9405-962440 Fax: 49-0-9405- 962441 http://www.minucells.de	**Mrs. Katharina Lorenz-Minuth** minucells.minutissue@t-online.de
Neuraxo Biotech GMBH Max-Planck-Str. 15a 40699 Erkrath (near Düsseldorf) Germany 49-211-617-851-0	**Dr. Josef Hofer** Managing Director Development **Barbara Behle** Director Business Development and Public Relations

A3.3.2 Electric / Electro-mechanical / Electronic

Firm Name / Address	Contact Name
ARI Services Europe Pearse Road Raheen Business Park Raheen Ireland 061-492222 Fax: 061-492266 http://www.arise-europe.com	
Volex Group plc Dornoch House Kelvin Close Birchwood Science Park Warrington, WA3 7JX England 44-0-1925-830101 Fax: 44-0-1925 830141 http://www.volex.com	Joe Gilmore Interconnect Systems Europe + South America S.L. Loh Power Systems, Global Robert Jones Wiring Systems, Global

A3.3.3 Healthcare

Firm Name / Address	Contact Name
ABB Industrial Systems Finnabair Industrial Park Dundalk Co. Louth Switzerland 042-9385100 Fax: 042-9385124 Website: www.abb.com/ie	
BBE Healthcare Coes Road Dundalk Louth Germany 042-9328177 Fax: 042 9328182 http://www.bostonbrace.com	
F. Hoffmann-La Roche Ltd Group Headquarters Grenzacherstrasse 124 CH-4070 Basel Switzerland 41-61-688 1111 Fax: 41-61-691 9391	Dr. Severin Schwan CEO, Diagnostics Division
GlaxoSmithKline Oral Care Youghal Road Dungarvan Co Waterford United Kingdom 058-20200 Fax: 058-20299 http://www.gsk.com	
KCI Medical Products Limited Unit H 17 Centre Point Business Park New Nangor Rd. Dublin 12 United Kingdom 01 465 9510 01 465 9500 http://www.kci-medical.com	

A3.3.4 Telecommunications/ Data Communications

Firm Name / Address	Contact Name
Marconi Communications Optical Networks Ltd West Pier Business Campus Old Dun Laoghaire Road Dun Laoghaire 01-6638300 Fax: 01-6638333 http://www.marconi.com	
Schaffner Holding AG Nordstrasse 11 CH-4542 Luterbach Switzerland 41-32-6816-626 Fax: 41-32-6816-630 http://www.schaffner.com/en	
Siemens AG Wittelsbacherplatz 2 D-80333 Munich Germany Central Office: 49-89-636-00 http://www.siemens.com	**Dr. Ulrich Eberl** Siemens Communications for Innovations ulrich.eberl@siemens.com
	Dr. Norbert Aschenbrenner Siemens Communications for Innovations norbert.aschenbrenner@siemens.com
	Ulrike Zechbauer Siemens Communications for Innovations ulrike.zechbauer@siemens.com

Appendix 4

A4 Marketing Collateral Materials

While undertaking the research of various technology parks around the world, the GLOBUSTRAT Consulting Group collected samples of sales brochures and other promotional materials. These samples have been segregated by geographic region and are contained in separate polyvinyl envelopes labeled "Marketing Collateral". Materials for the following parks and related economic entities can be found in their respective regional envelopes:

A4.1 Asia

A4.1.1 China

- Zhongguancun Science Park

A4.1.2 Malaysia

- Malaysian Industrial Development Authority

A 4.1.3 Taiwan, R.O.C.

- Hsinchu Science-based Industrial Park
- Industrial Development Bureau, Ministry of Economic Affairs, R.O.C.
- Industrial Development and Investment Center, Ministry of Economic Affairs, R.O.C.
- National Science Council, Taiwan
- Tainan Science-based Industrial Park Profile

A4.1.4 Thailand

- Thailand Science Park

A4.2 Europe

A4.2.1 The United Kingdom

- Sheffield Technology Park, England
- Edinburgh Technopole, Scotland

A4.2.2 Ireland

- National Technology Park, Limerick
- Shannon Region Development Agency

A4.2.3 Finland

- Technology Centre Teknia, Ltd.

A4.3 Middle East

A4.3.1 Qatar

- Qatar Science and Technology Park

A4.4 North America

A.4.4.1 U.S.A

- Hacienda Business Park
- Research Triangle Park
- Software Business Cluster
- Stanford Research Park

Appendix

5

A5 Representative Firms and Organizations – Supporting Industries

A5.1 National and International Accounting Firms

- Deloitte and Touche
- Arthur Anderson
- Cap Gemini
- Price Waterhouse and Coopers
- KPMG

A5.2 Human Resource Firms

- Hewitt Associates
- ADP Inc.
- PML Holdings Group
- Korn Ferry
- Townsend International
- Manpower Corporation

A5.3 Head Hunter Firms

- Korn Ferry
- Mercuri Urvall
- Manpower Corporation
- Kelly Services
- Adecco

A5.4 International and National Law Firms

- Baker and McKenzie
- Morrison and Foster
- Little and Company
- Bronson, Bronson & McKinnon
- Chapman & Cutler

A5.5 International Finance Specialists

- JP Morgan & Chase
- Merrill Lynch
- HSBC Finance Corporation
- Citigroup
- Bank of America

A5.6 International Trade and Finance Firms

- Covington and Burling

A5.7 National and International Logistics and Transportation Firms

- NOL Logistics
- UPS
- APL Logistics
- Kenco Logistics

A5.8 National and International Patent, Trademark and Copyright Specialist Firms

- Morrison and Forster
- Wilson Sonsini
- Litman Law, Patent and Trademark firm

A5.9 National and International Consulting Firms Particularly in Marketing, Technology, Entertainment, and Sports, etc.

- Accenture
- IMG
- Arthur D. Little
- Deloitte and Touche
- Cap Gemini
- Bearing Point

A5.10 Temporary Staffing Firms

- Robert Half International
- Accountemps
- Manpower Corporation

A5.11 Relocation specialists

- Atlas Van Lines
- United Van Lines
- North American Van Lines

A5.12 Technology transfer specialists

- Titan Consulting

A5.13 Personal services firms.

- American Express
- BridgeStreet Corporate Housing Worldwide