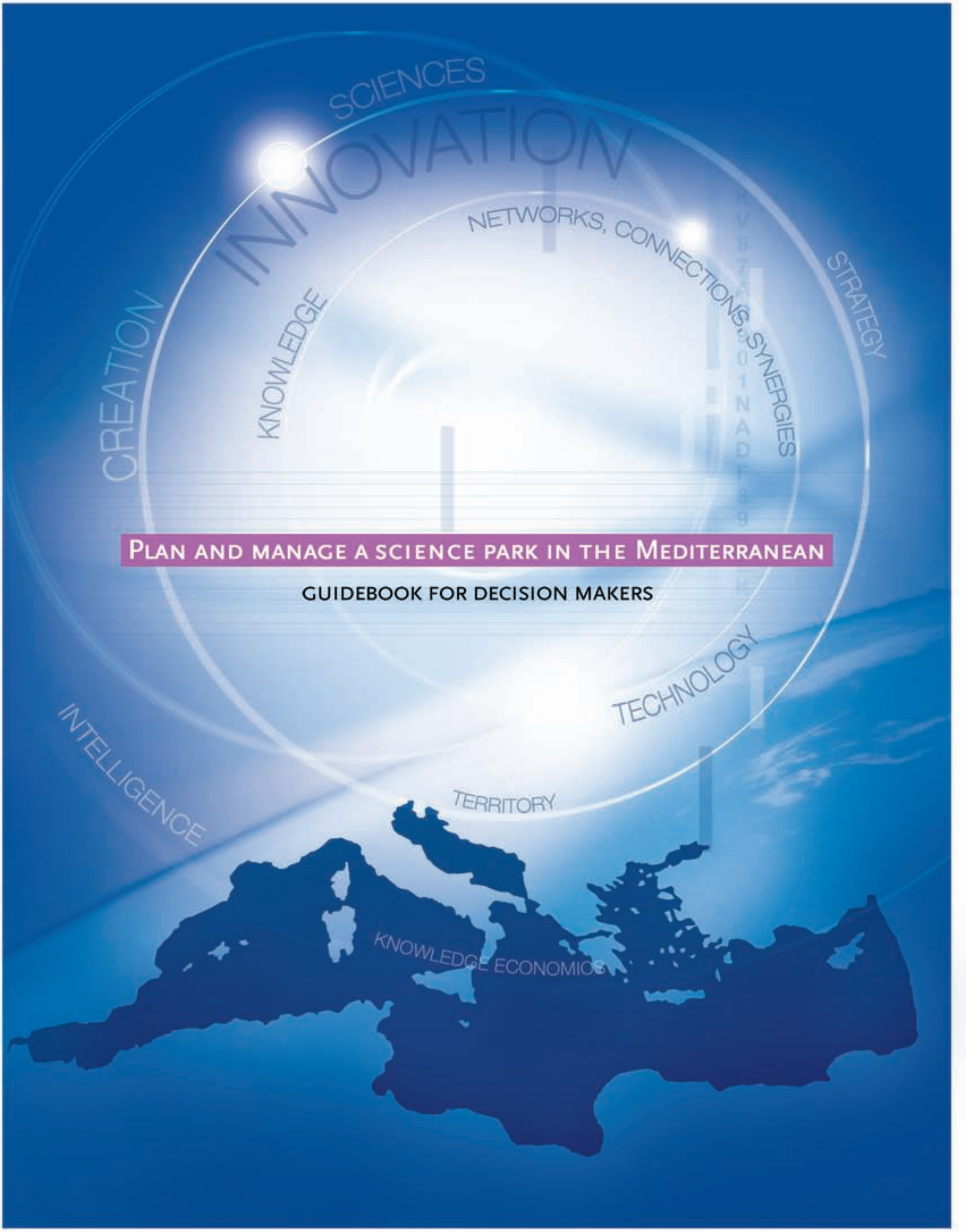
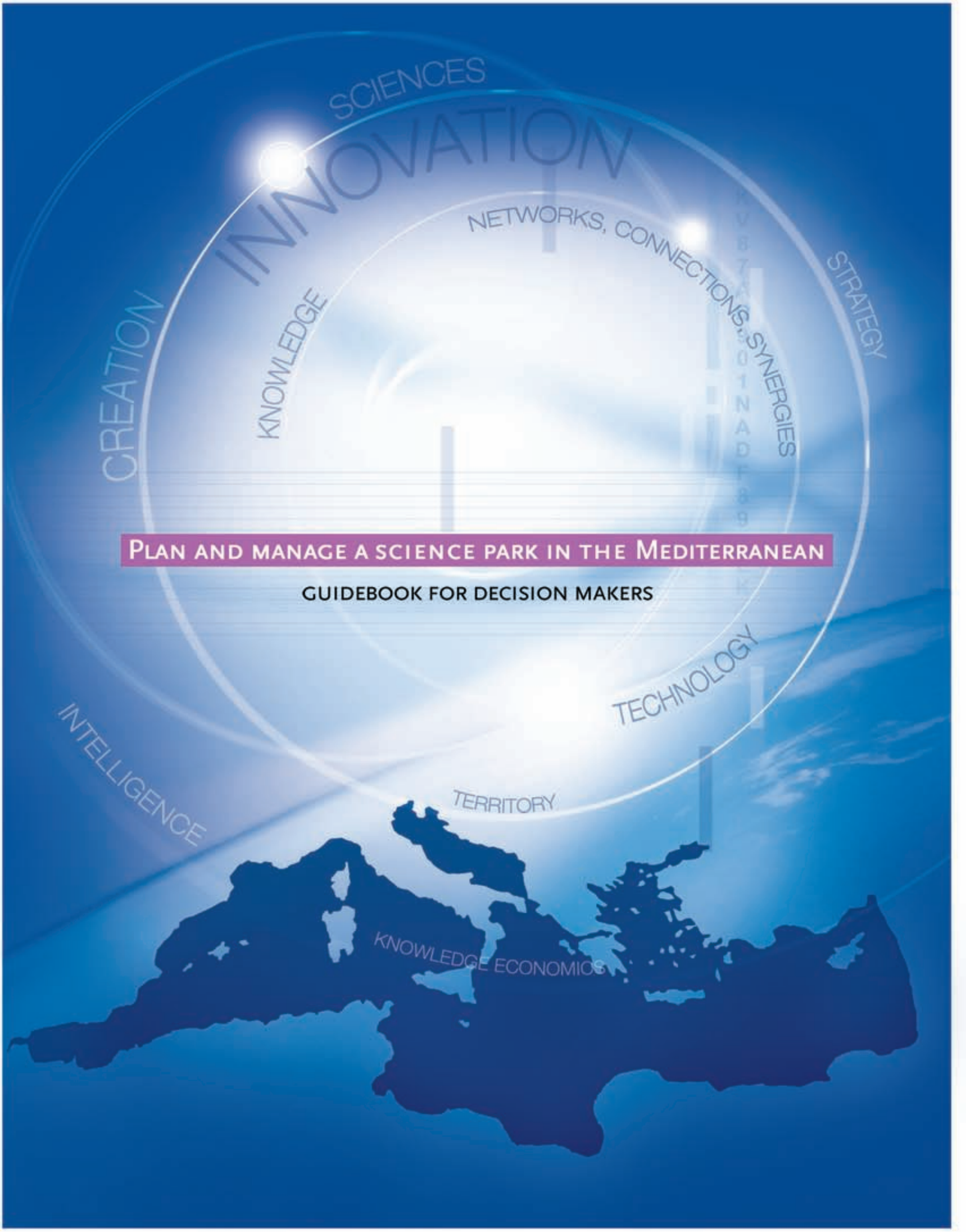


PLAN AND MANAGE A SCIENCE PARK IN THE MEDITERRANEAN

GUIDEBOOK FOR DECISION MAKERS

European Investment Bank
THE WORLD BANK
Enlarged Innovation and Technology Programme Medibtikar
VILLE DE MARSEILLE



Plan and manage a science park in the Mediterranean

Guidebook for decision makers

European Investment Bank

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Medibtikar

VILLE DE MARSEILLE

SUMMARY

INTRODUCTION

The genesis of science parks and technopoles

Economic conditions have changed considerably in the world's industrialized nations in the last decades. The break with previous trends has become so marked that the accepted development model is facing a fundamental crisis. These developments have led to the structural modification of urban and regional economic organization, with growth being influenced by the technological revolution, economic globalization, and the emergence of a new productive system. The combination of technologies and economies of scope has emerged as an important source of job creation and growth.

During the 1960 and 1970s, and particularly following the oil crisis, most countries increasingly recognized that innovation was a crucial element of competitiveness in the manufacturing and service sectors. They began to develop technology policies either to stimulate the transfer of public research results to create new products and processes or to enhance private sector efforts to innovate, notably through increased investment in research and development (R&D). These policies have taken the form of large public programs and procurement in high-technology sectors, incentives to engage in R&D, assistance in patenting, and deregulation of utilities. Over the last decade, a policy shift has taken place. Recent academic analysis of empirical evidence on the innovation process has shown no mechanical relationship between investment in R&D and innovation; rather, new products and processes appear to be the result of the involvement of many companies and institutions in a common endeavor. Innovation is therefore seldom an outcome of the effort of a single company or institution. As a result, governments have begun to direct resources to stimulate the emergence and strengthening of clusters of firms, links with research institutions and universities, and knowledge dissemination. Technopoles and science parks are particular features of these new policies.

Peter Drucker's book, "Innovation and Entrepreneurship", is a goldmine of insights into how innovation can happen: locate an opportunity, analyze local strengths, assess the community's receptivity, maintain a focus on a simple central idea, and exercise leadership. Following Drucker, many attempts have been made to structure the thinking about the dynamics of innovation and the process of forming technopoles and ensuring their sustainability, but very few educational initiatives have taken a broad cross-border approach and set challenging goals. Several flourishing technopole initiatives around the world make clear the importance of identifying structured development models, governance approaches, and strategic orientations for dealing with the cultural and institutional dualisms relating to private / public partnerships, research / industry collaboration, inter-ministerial cooperation and local / international orientation.

Technopoles and science parks

In this guidebook, a "technopole" is a structured community dedicated to the development of innovation (i.e. the science park in an urban environment[1]). A technopole usually brings together in one location (or spread across a region) the components necessary for making innovation happen: academics, research institutions, and enterprises. However, it mostly relies on momentum and a long-term vision elaborated by community leaders. The intangible side (energy, scientific knowledge, social consensus, entrepreneurship) is as important as the material side ("hard" infrastructure, technology facilities, R&D investment). This dichotomy reveals the challenge of setting up a technopole.

1 See Chapter 3, Section 3.2

While there is the potential for establishing new parks and technopoles in most countries, as a number of relatively important cities do not yet have the necessary infrastructure, absorption capacity has certainly diminished at territorial and national levels. Support policies increasingly depend on the capacity of parks to contribute to the development of entrepreneurship, to participate in cluster initiatives, to generate spillover effects, and more generally to enhance the regional culture of innovation. For policy makers, parks and technopoles are not to be developed for their own sake but must contribute to the building of learning regions and knowledge-based territorial economies. The bursting of the high-technology bubble at the end of the 1990s made clear the need to respond to local and regional demand rather than systematically embarking on high-technology research. In certain cases this means more encouragement of virtual activities and less concentration of high-technology activities. Quasi-parks, incubators or network policies could be the most appropriate policy instruments for a development strategy.

According to many authors, cross-fertilization is at the heart of technopole projects. Pierre Lafitte, the founder of Sophia Antipolis, for example, has defined it as "the bringing together, within the same location, of high-technology activities, research centers, companies, universities, and financial institutions. Contact between these entities is promoted in such a manner as to produce synergies from which new ideas and technological innovation can emerge, and therefore trigger off the creation of new companies."

Operationally, technopoles and science parks are groups of research and business organizations with a common interest in all aspects of scientific development, from the laboratory to manufacture and commercialization. They constitute industrial zones, composed predominantly of small and medium-sized companies, with offices, laboratories and production units located within an attractively landscaped setting. They are frequently located within a defined area that contains both public and private sector higher education institutions (HEI) and technical research establishments. This space draws together high-technology economic activities working towards future innovation, a set-up which theoretically encourages mutual assistance. The fundamental nature of the "technopolisation" process can be summarized as follows:

• The technopole is essentially an image for the perceived framework of economic forces and thus defines the productive space of the twenty-first century;

• The technopole provides the space for a new economic organization. It favors the installation of a new logic of production by seeking links between innovative industry, private and public research, and higher education. One of its essential functions is technology transfer;

• The technopole offers a particular form of location. Its planning, architecture and leadership are all conceived to promote the establishment of a new socio-productive order;

• The technopole creates a form of territorial polarization within a wider geographical space. It thus provides an interface between productive relationships based on proximity and a broader global perspective and a stimulus for dynamic development.

The organization of technopoles and science parks can thus be explained as an attempt to increase innovation by minimizing the transaction costs due to institutionalized constraints that previously hindered collaboration by economic bodies. Technopoles and science parks therefore play a new and dynamic role in the spatial division of labor that characterizes contemporary industrial organization.

Innovation, a possible answer to the Mediterranean industrial gap

The southern and eastern Mediterranean market has a GDP of US $1 trillion and a population of 270 million. With GDP growing fast in recent years and a declining birth rate there is some hope of a convergence with Europe. The economic mood is improving, both in oil countries (e.g. Algeria) and in more diversified economies (e.g. Egypt, Turkey, Morocco). FDI is booming. Investors have returned since 2002 and despite the global crisis that started in 2008, the region's strong points are clear to European partners: major infrastructure projects are under way in all countries, stable currencies support growing markets, the banking system avoided toxic investments in some countries (e.g. Lebanon) and a well-educated (e.g. in Tunisia), Internet-literate middle class is emerging with a highly promising 20-to-35-year-old population. All this makes Mediterranean countries a potential source of growth and competitiveness, owing to their (still) relatively lower-cost workforce.

However, the Mediterranean countries' economic situation remains difficult. In most countries, the industrial fabric is weak. The productive system is mainly characterized by small enterprises with a strong specialization in low- and medium-technology sectors, such as agro-food, textiles and clothing, footwear, furniture, mechanics and capital goods. With the exception of energy, petrochemicals, minerals, agro-business, real estate, tourism and some new sectors (ICT, offshoring), industry lacks depth, integration, and an international dimension (outside of a few areas such as Tanger Med, Arzew, Southern Tunis, Alexandria, Bosporus).

Most domestic companies do not meet international standards. The few exceptions are dominated by foreign partners or competitors and mainly serve as subcontractors or assemblers. They do not control the strategic segments of the value chain (branding, design, work organization, marketing, logistics, R&D, distribution, etc.). Because small and medium enterprises (SMEs) face obstacles to development (infrastructure, financing, trade barriers, red tape, poor Internet service), they cannot easily contribute to growth and job creation. The formal sector is sometimes a minority employer. Entrepreneurship, innovation and university-industry relationships are limited. This explains the relatively weak position of Mediterranean countries in world trade: with 4% of world population, they have 2.6% of exports (including energy), fairly modest intra-Mediterranean trade (5 to 6%), and a limited contribution to high-technology exports (less than 10%).

Except in tourism, agro-business, energy and petrochemicals, the southern and eastern Mediterranean countries do not have major comparative advantages. The well-known example of oranges vs. software in Israel's exports[1] shows that technology might be a better choice than traditional industries. Though the MEDA market is growing, it remains fragmented.

In order to gain in relative competitiveness and climb up the value ladder, the MEDA countries must be carefully positioned on the global economic map. A renewed Mediterranean identity and branding could include (i) a balance of traditional and new industries, (ii) a breakthrough in light industries (by using lower costs and full adoption of European norms and standards to benefit from the nearby EU market), (iii) a strong development in services (direct services to people, such as tourism or medical care, or offshored services for remote companies), and (iv) a combination of quality of life, cultural values, exceptional sites, and natural product. Such a positioning implies the incorporation of more technological and innovation content in the Mediterranean production processes:

1 Both represented US$250 million in 1992, but in 2003 software contributed US$4 billion to exports, while oranges stayed at US$250 million.

• This concerns all sectors (e.g. agriculture, traditional industries, services such as tourism or finance, new industries) and daily operations (mainly by absorption of up-to-date methods and technologies) throughout the country or territory (i.e. beyond privileged urban dwellers, high-technology engineers, or foreign-owned enclaves);

• The diffusion of technological progress mainly occurs through various types of exposure: people travelling abroad (businessmen, students, the diaspora), inward foreign investment and trade (involving transfers of innovation and know-how), education and the media (TV, cell phones, Internet, networking), and public initiatives (technology centers, innovation agencies, support programs or tenders);

• In spite of the Phoenician, Greek, Latin, and Arab world's early contributions to science and culture, the vast majority of Mediterranean countries do not currently play a leadership role in technological innovation. However, they can play an excellent role as adopters through their absorption of technologies, thanks to their geographical and cultural proximity to Europe, the important community of Mediterranean-born scientists in Europe, and the importance of migration flows (workers, tourists, students);

• In marked contrast to the past, today's innovations can spread worldwide in just a few years (the cell phone, invented 27 years ago, is now used across the globe). For this reason, Mediterranean and other emerging regions can hope that shortcuts (leap-frogging), astute solutions and an appetite for innovation will allow them to make a rapid technological recovery.

Given the constraints (money, availability of leaders, innovation gaps), a Mediterranean innovation strategy needs to rely on a double effort: the creation of a Euro-Med innovation and R&D community at an international level[2], and, at a country level, innovation poles to nurture the industrial fabric. The latter, and the private companies they support (mostly SMEs), are the key to innovation and technological progress.

To increase their productivity and efficiency, companies need to increase their interaction with innovators, technology experts, and management and funding advisors. However, governments and local authorities play a central role in ensuring the acquisition of technological capabilities by the general population (schools, universities, vocational training), in providing the needed physical infrastructure (for information technology, incubators, clusters, resource centers), or in establishing technology programs or innovation agencies.

In recent years, innovation poles, such as science parks, technopoles, high-technology clusters, or valleys, have appeared throughout the Mediterranean region. The issue now is to transform these initiatives so that they benefit the countries' economy sustainably.

2 Innovation often implies the mobilization of a critical mass. By nature, it is an international activity. In addition, common problems around the Mediterranean basin call for collaborative work.

A guide for decision makers involved in technopole planning and development

The European Investment Bank (EIB), the Medibtikar[3] program of the European Commission, and the World Bank have therefore recently adopted a number of actions to help Mediterranean countries develop technopoles and science parks:

• The European Investment Bank is supporting the Tunisian government's development of five new thematic technopoles. The support involves financing facilities and technical assistance to help organize and develop the capacity of the poles' future managers;

• Between 2006 and 2009, the Medibtikar program has developed a course for Mediterranean incubator managers to improve their ability to mentor start-ups in terms of positioning and growth readiness and help them create joint projects with other entities in the park;

• The World Bank office in Marseille has recognized expertise in the field of territorial development and innovation. It develops, in the Mediterranean region, communities of practice, experience sharing, and networking as part of countries' territorial development. One of the key issues addressed by this program was the planning and development of science parks on the basis of national and local authorities' criteria.

In the course of their experience, these three institutions discovered that little had been written about technopoles and science parks in any comprehensive way. Therefore, the need was felt to take stock of these countries' experience and of the knowledge accumulated by experts regarding the planning and management of technopoles and science parks and their creation process. The result is this guidebook.

Principles underlying the guidebook

Three principles underpin this guidebook and the setting up of a science park or a technopole:

• Content is most important. The positioning of the technopole should depend on the country's and the local territory's industrial strategy, and the infrastructure should be established to serve it;

• Pooling is crucial. The management of a technopole cannot carry out all of the missions and services needed by its users and stakeholders. It soon faces a lack of funding, of internal competences, or of onsite critical mass. The pole will therefore benefit from having national and international connections for developing capacity-building services, for expert services, for the international development of the technopoles and their stakeholders, for collaborative projects, and for cross-fertilization of competences developed within the pole and those developed in other technopoles or parks;

• Territorial integration is a must. A technopole should be considered as one of the city's lungs. It creates jobs, knowledge, transversal social exchanges, and, in the end, economic value for the territory. Its promotion to the city population and economic actors, its accessibility, its links with other innovation actors in the city should be addressed with special care. The governance of the technopole should reflect this integration.

3 Euromed Innovation and Technology Program, led by Intrasoft International in partnership with ANIMA Investment Network, BDPA, CKA, Planet, and Zenith.

This guidebook does not intend to propose recipes or readymade solutions. Its objectives are to define and explain the functions of science parks and technopoles and the interactions between them; to help decision makers formulate the right questions concerning development planning and the management of the science park; to propose, where possible, checklists of issues to be dealt with, based on previous experience; and to offer a number of examples to which decision makers can refer can refer in order to address issues raised in the guidebook.

Nevertheless, the vision of the guidebook's promoters goes beyond the definition of a structured approach which favors the establishment of technopoles to the creation of a new social context that nurtures creative people and helps them to implement innovative ideas; while the technopole is to be knowledge-based and revenue producing, it should also provide a sustainable quality of life and a healthy, safe, and culturally favourable work environment.

The institutions behind the guidebook believe in sharing information, in supporting the Mediterranean countries involved in knowledge-based endeavors, and in learning from and helping them locally as well as globally through partnerships and collaboration. The guidebook is therefore a work in progress. It is a continuing effort to reach an organic and fruitful international technopole culture.

From planning to serving users: review of the guidebook chapters

The guidebook has been designed to deal with the complexity of science parks and technopoles and has ambitious goals: the realization of an inventory of international experience (services, governance) with relevance to the specific social environment and context of Mediterranean industry; the identification of key financing and organizational processes (planning, starting up, developing, and running a science park) and stakeholders (policy makers, enterprises, universities, urban and territory managers, pole managers); the selection of international initiatives which can support MEDA science parks.

Chapter 1 first sets the scene, addresses legal framework issues, and emphasizes the roles of the different stakeholders. It stresses the role of the state, with regard to the countries' industrial and development strategy, and parks' capacity to attract the private sector and serve its development. It analyzes possible public-private partnership models and the drawbacks and risks of a mixed governance of science parks. The major components of governance and their applicability are reviewed to complete the overview of international approaches and policies.

Chapter 2 focuses on strategies to ensure the attractiveness of the park, its positioning and sustainability. Science parks create an influx of people, institutions and businesses, but the local community strongly influences the park's trajectory. The challenge lies in making a positive change while retaining local core values and competences in both traditional (textiles, leather, agro-food) and new technology sectors (information technology, biotechnology). Attractiveness, specifically international attractiveness, depends on a park's sustainability in terms of its business and market position and on making the best of local intangible assets. The chapter explains why the economic context is important for MEDA's science park development strategies. It examines the region's advantages (youth, proximity to developing markets, relatively low cost of highly skilled human resources, infrastructures) and drawbacks (lack of innovation culture, complexity of governance, limited financial means, strong international competition).

Chapter 3 deals with the development of park infrastructure and linkages with the urban surroundings. The creation of the park is often led by the central government but local authorities play an important role in establishing the basic infrastructure for business and innovative activity. These general conditions range from city planning to transportation and a wide variety of public services ranging from basic education to business incubators. Urban integration includes closer integration of public services with the creation of new knowledge and expertise within the technopole and active collaboration on the design of new products. The public sector may be involved in many ways in creating and utilizing the social goods and services and system innovations generated within the technopole.

Chapter 4 presents various ways of financing both a park and the development of its members. It shows that providing funds for innovation, creating value from technology, and project development are among the park's key tasks. It analyzes international technology transfer and value-creating models, strategic approaches, and financial instruments, including those dealing with the early stage of the innovation process. It includes a review of international case studies.

The focus of **Chapter 5** is serving users, i.e. start-ups and enterprises, and collective and individual coaching (or mentoring) processes. This chapter intends to provide coordinators of parks and technopoles with basic methods for developing services for users, by addressing various issues linked with the positioning, development, and internationalization of firms, the design of collaborative projects, and the efficient diffusion of information to strengthen stakeholders' activities.

Reader's manual (how to use this guide)

This guidebook provides science park decision makers with a number of tools to help them manage a park. A number of strategic options are presented, and in this respect the guidebook can assist the decision making process. It can also help to benchmark a park with parks in other countries (see Annexes).

Regarding the more practical aspects, the guidebook presents a number of checklists which can be used when assessing projects. It provides information on how to proceed with a potential tenant. It emphasizes ways to search for partners, manage innovative projects, and identify investors. Its many diagrams and figures can assist tenants in understanding the functioning of a park and finding solutions to strategic issues and financing problems.

CHAPTER 1
SCIENCE PARK PLAYERS AND PARTNERS

- 1. The stakeholders
- 2. The role of the State
- 3. Strategies to mobilize the private sector
- 4. Enhancing the innovation environment

Highlights

A technopole or science park is not an end in itself but a tool for development. The partners that support a park project include: public authorities in charge of land development (or responsible for the land on which the technopole will be built); higher education and research establishments looking to create value from their resources; and industries wishing to increase their competitiveness through networking.

The operation is usually run by a financially powerful public sector or public-sector-related player and is subject to a contractual arrangement whereby all partners, regardless of their financial contribution, must manage the launch phase together. The institution financing the infrastructures and facilities needs to have a certain legitimacy as it invests funds either directly or through a semi-public organization or a parapublic institution.

Governance plays an important role in the science park and will often be based on an association of all the actors and the observance of general governance principles. Such an association must be given clear coordination tasks; the management team must match the needs and expectations of the public and private stakeholders; an agreement between the association, the developer, the planning contractor, and the partners should link the various aspects of the science park project (prospecting of companies, development of installations and facilities, coordination, promotion, etc.); there should be consultation procedures and coordination bodies, to promote the development of mutual trust, and an arbitration body, to settle disagreements between partners. A board of directors should be set up, which groups the founding partners, including their elected representatives, into various bodies. Economic and financial players, and researchers and academics, should also be grouped into relevant bodies.

To mobilize the private sector, many science parks (as in France) have set up accreditation committees to select appropriate companies. Park sponsors must have control of the design and construction of the site in order to control the accreditation process, either directly or by drawing up ground rules with private sponsors. Defining the common interests of the science park and its marketers is also a way to safeguard the accreditation process.

To manage the flow of projects effectively, science parks need to set up a full-time coordination unit to implement strategy - in particular for communication procedures and the support program for company creation - and to engineer projects. Project engineering involves: identifying technological development projects within or between companies or in research laboratories; mobilizing the skills, expertise and resources needed to define an action program within the framework of a project management operation; and supporting the implementation of the project, through specific coordination measures.

When considering the business model and financial risks inherent in a science park operation, it is worth remembering that management of such an operation does not generate in the short term the returns that would attract a private investor to own and manage the science park. The participation of public institutions interested in direct or indirect spin-offs is therefore necessary, but private investors and operators must take their full place in the implementation and running of certain parts of the program.

Although the return on investment in a science park may sometimes, although not necessarily, be negative, the return on public investment can be usefully calculated in terms of social impact (e.g. jobs created, extra tax revenues generated, environmental impact). To pave the way for a private market, massive and continuing public funding is necessary, especially for research and technical training, infrastructure development, interface structures (incubators, transfer centers), and property rental programs.

The establishment of a park or technopole requires time: it takes at least ten years to complete the first significant phases of the project. Therefore, it is important to keep all options open with regard to infrastructures and facilities, as these may become obsolete as a result of the waves of technological innovation that sweep the market and the new scientific and technical knowledge that fuels the economy every ten years or so. It is therefore wise to keep possibilities for upgrading in mind and to keep land in reserve to allow for significant future development if market conditions are favorable.

1 The stakeholders

1.1 The partners and the legal structure

Many partners from the private and public sectors (firms, higher education institutions, research labs, government entities) are involved in launching a technopole.

A technopole or science park is not an end in itself but a tool for development. Given the nature of the activities to be coordinated and the facilities to be financed, the project must have appropriate support from a broad spectrum of partners from the earliest stages.

The stakeholders include public authorities in charge of land development or responsible for the land on which the technopole will be built. They also include higher education and research establishments looking to create value from their resources. Such resources need not be located within the technopole, but they should be related to the facilities or activities being developed within it. Companies also have a role to play, either individually or through their professional or commercial representatives. Finally, in the case of projects of national interest government bodies often participate in the initial roundtable discussions[1].

Hence a clear set of rules must be drawn up from the outset for the organizations in charge of development, marketing, promotion, and coordination. The goal is to guarantee efficiency and clarity of operations in order to avoid, for example, a single company being approached by different organisms presenting contradictory arguments or associated organisms promoting contradictory objectives[2].

The institution financing the technopole infrastructures and facilities must have a certain legitimacy to do so. It invests funds either directly or through a semi-public organization or a public institution[3].

In practice, there is a certain degree of flexibility in agreements and structures which enables institutions and companies involved in the development of a technopole to work together. However, it is good practice to set up a strong leadership structure.

Management needs to be able to mobilize partners and to exert leadership.

Experience shows in fact that, despite market surveys, priority technological themes, and shrewd institutional set-ups, the success of the science park project during the start-up period depends on the efficiency of the management structure. Strong leadership is important both to ensure the consistency of the concept, the program, and the science park's economic development role, and to adjust the development of the park on the basis of the initial results. Thus, when strategies are reviewed en route to completion, the sectors originally targeted may not prove instrumental in the park's success, and programs may need to be updated.

The operation is run by a financially powerful public-sector or public sector-related player but is subject to a contractual arrangement whereby all partners, regardless of their financial contributions, must manage the launch phase together.

Nevertheless, excessively strong leadership can make it difficult to establish partnerships, which are fundamental to the development of science parks. For example, a public university (which is often on the lookout for funding), a chamber of commerce, or a small technology company cannot be expected to finance science park infrastructures and facilities. Their contributions will be modest but decisive to the success of the operation. Experience has shown that this is a difficult issue.

To avoid dilution of power and lack of visibility, charters can be established to help preserve the dynamics of the science park and enhance the coherence of its strategy.

The signatories of the science park project charter set up a steering committee, the role of which is to ensure that the implementation phase and the management, marketing and coordination of the site(s) are consistent with the partners' joint project.

1 The French government participated actively in the development of the Sophia Antipolis science park, particularly with regard to the purchase of land (which is very expensive in the region). **2** This happens more often than one would think. **3** The General Council of the Alpes-Maritimes region has invested heavily in the Sophia Antipolis science park (around EUR 150 million over 30 years). It has invested mainly in infrastructure and facilities. The Rennes Atalante science park, like many others in France, has benefited from investments by a semi-public company (SPC) (facilities, real estate, etc.). In Morocco, the Deposit and Management Office has played a similar role in the Rabat science park project (through one of its subsidiaries).

1. The stakeholders

1.2 Science park coordination structures

Coordination appears as one of the main aspects of science park management. The easiest way to do this is to set up an association of all the different actors.

An association is often established to run the science park. As it is a separate legal and functional entity, its role is not linked to other activities performed by public authorities; this strengthens the participation of partners in managing the park (see Box 1.1 below). The association's recruitment procedures are more flexible than those of public authorities. The association provides access to both public and private funding.

Box 1.1

Conditions for effective coordination

To enable a science park association to operate effectively:

- **It must be given clear coordination tasks;**
- **An agreement should be drawn up between the association, the developer, the planning contractor, and the partners concerned, which links various aspects of the project, such as prospecting of companies, development of installations and facilities, coordination, and promotion;**
- **Consultation procedures and coordination bodies must be established to promote the development of mutual trust;**
- **A political arbitration body is essential to settle disagreements between partners;**
- **Policy makers should not be asked to chair the association: instead, a board of directors should be set up, which groups the founding partners, including their elected representatives, into different bodies: economic and financial players, and researchers and academics, should also be grouped into relevant bodies.**

Once the association has been set up, it is important to recruit managers with suitable experience. Science park coordinators must take account both of public and private interests and often have an unusual career path. They will be involved in a broad range of activities such as prospecting companies, promotion, development, technological research, and creating and developing companies. More and more, developers and their partners look for managers with proven experience both in public authorities and private companies. Insofar as the main task of science park or technopole coordinators is to bring people together and identify projects, their ability to listen and their communication skills are essential to the success of these operations. Very few people have these qualities and experience. Young graduates in economics or technology with some working experience (often in an SME) can strengthen teams but are seldom mature enough to lead them. In general, coordination teams start out with an average of 3 to 6 people. They may later be bigger depending on the scale of the operation.

Coordination is not all-encompassing; it should rely on a few well-targeted measures to promote cross-fertilization or facilitate the implementation of technological projects. It should participate in the economic development plan implemented within the metropolis or the city. The links between science park policy and economic development policy should be defined at this level of governance.

2 The role of the state

2.1 The legal framework and national policy (innovation, research, urban development, etc.)

Science parks are local endeavors…

Science parks are mainly local initiatives, backed by the management of towns, cities and economic regions. This "bottom-up" approach makes defining national policy in this area more difficult.

Innovation can be defined as the process of transforming an idea into products or services that bring new added value to a customer. Companies that innovate make use of external information, skills and resources. Consequently, public initiatives that provide financial assistance for innovative projects but also support projects, infrastructures, and facilities that foster communication between companies and their knowledge environment (their innovation ecosystem) contribute to innovation policy. The development of competitive cluster and national innovation policies is now high on the political agenda[4].

…but they can be a target of national frameworks and innovation policies and other central government research and industrial policy initiatives…

National innovation policies often have a regional dimension but cannot be developed on an infra-regional level without undermining the role of the local authorities in charge of these regions. This said, the history of science park development does offer exceptions. Sophia Antipolis in France, which was established before the decentralization laws of 1982-1983, received a great deal of support from the French government, which wished to make it a pilot operation of national interest. Whilst today such support would not be possible, the concept of a "region of excellence" still remains, as the French authorities have recently demonstrated[5].

Innovation can no longer be driven by individual companies. It increasingly requires cooperation among several players, and not only companies but research centers and universities too.

It is no longer possible to discuss science parks and their governance structures without alluding to other national policies, such as cluster policies, centers of scientific and technological excellence, and urban planning policies[6]. This is why local sponsors must now, more than ever, consider the links between their science parks and other regional or national initiatives that play a key role in the emerging knowledge economy.

2.2 Cluster and science park policies

…such as cluster policies.

The purpose of cluster policy is to establish in a given geographical location[7] clusters of companies, research units and training centers working on innovative projects[8] with an international dimension. Local authorities are not unfamiliar with the concept, as they have for years brought companies and research laboratories together in science parks or technological networks[9].

Many countries have experience with such policies, and have established interesting means of operation.

Cluster programs are often specialized (these are examples centred on SMEs in Finland, university R&D in Japan, and science parks in the United Kingdom). Furthermore, they are relatively focused and attach a great deal of importance not only to the management and coordination of clusters, but also to cooperation between the ministries involved. It is broadly acknowledged that cluster programs can require a long time to take effect.

4 As defined in the law on innovation passed by the French parliament in 1999. **5** An example is the recent quality certification, in France, of 10 scientific and technological universities with international ambitions. In Germany, the federal government and the Länder have decided to allocate EUR 1.9 billion to 9 "elite universities", up to 2011. **6** The first thing the French authorities did when setting up the Saclay science park, in the south of the Ile-de-France region, was to organize an international urban planning competition. Nonetheless, national urban planning policies apply to all technopoles and their environment without exception. **7** Usually a region, but some science parks straddle several regions. **8** As define in Call for tender documents, DIACT, November 2004. **9** See www.competitivite.gouv.fr.

2. The role of the State

Such programs seem to have produced results. In Finland, the Center of Expertise program launched, in 1993, was extended in the late 1990s, owing to its success in creating and saving jobs. In France, despite implementation problems - due, to some extent, to the complexity of government funding procedures and the fragility of the clusters - the impetus given to the program has generated interest among companies and researchers far beyond original expectations[10]. This relatively recent program will be fully assessable only in the medium term.

In this context, the quality and efficiency of cooperation between clusters and regional innovation systems[11] will be critical to their success. Regional authorities are particularly concerned, insofar as they play a role in the coordination of these innovation systems. They must establish their priorities[12] and define effective communication procedures. Science parks, by their vocation, are affected by national policies, although they are not involved in their implementation[13]. Regional players are affected by:

- National innovation and technological development policies;
- National competitive cluster policies;
- Regional innovation policies;[14]
- National and regional cluster policies, and;
- Science park policies.

However the coexistence of many policy initiatives complicates governance tasks in science park projects.

To be effective, science park policies must take higher levels of governance into account. Sponsors of science park projects also need to take advantage of national or regional policies, which are often accompanied by funding for research and innovation.

They must also factor in local economic development challenges, which cannot be met by adopting an approach that is too specific, in terms of technological innovation for example. Of course, all business and economic sectors are potentially concerned by innovation: industry, trade, handicrafts, services, etc[15]. Most companies try to innovate, even minimally, to remain competitive. They not only innovate in terms of products, services and technologies (if they use any), but also their organization and management structures.

In this respect, a narrow view of innovation, in technological niches for example, reduces it, on a local level, to a few noteworthy activities that have no effect on development. As innovation requires a variety of elements and inputs, a diversified economy will have a greater development potential than a specialized economy[16]. Finally, innovation cannot be pursued without creativity and entrepreneurship. Stimulating creativity and entrepreneurship in a region or a metropolis means encouraging, assisting, and supporting their development. In short, creativity and entrepreneurship should be at the center of economic policy, in order to gradually build the foundations on which competitive clusters and innovation projects can prosper.

Science parks lie at the crossroads of many, sometimes conflicting, ambitions. They must contribute to the success of national policies, local economic and technological development policies, and, in a broader perspective, innovation efforts.

These different strategic objectives, which will influence the governance of technopoles and metropolises alike, must be clearly recognized when defining science park projects. Metropolises and regions must take them into account within the wider framework of managing their economic policies.

10 In all, 104 competitive cluster projects were submitted following the government's call for tender. 66 were selected initially, followed by a further 5. **11** A regional innovation system is the system comprising all public and private sector players involved in company innovation, company creation and technology transfer processes. **12** The Urban Community of Lyon has set up two competitive clusters, which play an important role in its development: Lyon Biopole and Axelera Chimie Environnement. The related economic and scientific activities are mainly located in the Lyon metropolis, which already played an active role in this area, through its innovation support policy. **13** However, a small number of science parks-such as Atlanpole and Atlantic-Biothérapies-act as support structures for competitive clusters. **14** The European Commission encourages European regions to reinforce their regional innovation policies. **15** In this case, a broad conception of innovation is the most compatible with the dissemination of an innovation culture across a metropolis. **16** A diversified economy will ensure development over the long term and will make the local economy more resilient. Industry and services are equally important. Of course, some activities can be used as loss leaders as part of a marketing strategy, but traditional activities still play an active role in economic development and job creation.

3 Strategies to mobilize the private sector

In order to attract high-performing firms ...

The performance of science parks and technopoles depends on their age, their location (for example, their proximity to a university and the quality of the surrounding infrastructures), their state of development and the maturity of the local knowledge economy[17]. Companies assess all these factors before deciding to invest. Those that decide to set up offices in the park or technopole also hope to take advantage of its public image and its location in order to strengthen their links with research centers and universities and to develop their communication policy. Park and technopole managers therefore implement image-promoting strategies and spotlight their comparative assets to ensure the long-term success of the areas under their responsibility.

3.1 Accreditation

...many science parks have set up accreditation committees.

Technopole sponsors must have control over the design and construction of the site in order to manage the accreditation process. This is done either directly or by drawing up ground rules with private sponsors. Defining the common interests of the science park and its marketers is another way of strengthening the accreditation process.

Science parks can be broken down into two categories: those that have an accreditation committee[18] and those that do not. Accreditation processes may be either strict or de facto. Strict processes may gradually become more flexible. For example, a single theme approach – dedicated biotechnology sites, sites devoted to mechanical engineering technologies, etc. – is difficult to maintain over time. Nowadays, the quality and innovative capacity of a company are more important than technological specialization[19]. In addition, accreditation committees can rent (or re-rent) property without going through the owner. De facto accreditation operates on the basis of the obligations it creates and the specific features of the technopole environment. It "discourages intruders"[20] by obliging companies to join an inter-company association or denying them access to the inter-company restaurant, for example. If the site is highly specialized, companies not operating in the field will generally not apply. Finally, the cost of setting up offices in a technopole weighs heavily in a company's decision[21]. The company must carefully calculate its return on investment before moving in, as well as the impact in terms of its image and reputation.

The selection criteria used by technopoles include economic, scientific, technological and financial criteria (see Box 1.2). All science parks also take into account the financial soundness of an applicant company. The criteria must be in line with the science park's priority thematic areas, in particular its areas of excellence[22].

Box 1.2

Admission standards for candidate tenants at the Moroccan Information Technopark Company (MITC)

Applicant companies for the Casablanca Technopark are judged on their innovativeness, added value, multinational nature, entrepreneurial characteristics, and capacity to take advantages of synergies. Once the application is transmitted to the commercial department, the candidate company is evaluated by the general management. If the decision is favorable, the candidate is invited to present its project. The selected candidates are then examined by the selection commission. The companies are informed of the results by the commercial department of MTIC.

Source: Casablanca Technopark Internet site.

17 This is often a key factor for success. **18** The legal basis on which these committees operate remains very shaky. In other words, science parks cannot prevent the sale of a plot or the rental of premises. **19** Furthermore, innovation does not have to be technological; companies involved in marketing or organizational innovation can benefit from cooperation with management schools or university economics departments. **20** The history of French science parks is riddled with anecdotes about attempts made by distribution companies to force their way into technopoles. Sometimes the outcome is positive, as in Labège, Toulouse. Sometimes it is less so. **21** Technopole locations are generally expensive. **22** The goal is to focus on specific thematic areas, give free rein to cross-fertilization between these areas and take account of local economic realities; defining the strategic objectives of a science park is always a difficult task.

3. Strategies to mobilize the private sector

The accreditation process involves both political and technical considerations. The selection criteria must take both aspects into account. For example, outside companies may be expected to use local subcontractors, participate in economic cooperation schemes with a partner university, etc. Such considerations will influence the final decision.

One issue is whether companies in the park should participate in the committees. Owing to potential conflicts of interest, some may be unable to evaluate objectively the site's overall interests (they may not want to accept competitors). However, having well-respected company managers on the committee is regarded as an advantage. Examples of eligibility criteria include:
- postgraduate or vocational education activities;
- research activities, activities that are technologically innovative or involve experimentation;
- production activities that use high-added-value technologies or are related to research or higher education institutions;
- collective services, installations or facilities relating to the park's activities or necessary to its operation.

In addition, the accreditation committee can oblige any research center, training center, or company moving into the technopole to become an ex-officio member of the science park coordination committee and to observe the rules laid down in its statutes.

3.2 The science park identity

If several industrial areas in the metropolis or the region wish to obtain the science park label, the science park project must have a strong and highly specific identity.

If the science park is to succeed in promoting new forms of economic development and a new corporate culture, its communication policy must make its identity and its originality known to customers and partners throughout its area of economic influence.

Promoting a science park project is necessary not only to attract companies and entrepreneurs, but also to spread the technopole culture across a region. Therefore, the coordination team's first tasks are to give a name to the project and to develop the means to promote its objectives and ambitions. A newsletter presenting the innovative activities carried out in the metropolis or the region – by the university, research centers and companies together or by the business sector alone – could be a way of introducing the economic community to the science park mentality and to technological innovation.

Such a newsletter could cover other business parks and also traditional industrial areas. Companies that do not meet the accreditation criteria for the technopole project might find a more suitable location in other nearby industrial areas. Government bodies in the metropolis or the region should promote these alternatives in order to provide a range of possible locations for different business needs and different stages of development.

Finally, science park projects are an integral part of the planning and development policy of a metropolis or region. Governing bodies must take account of the stakes involved in these projects and ensure that they are compatible with other development projects in the areas of trade, tourism, industry, logistics, etc.

3.3 Applied research and technology transfer

There should be applied research and technology transfer institutions on the site to meet the demand of firms on the park.

The science park – in concert with public research and technological development centers – must ensure that facilities and services are adequate to meet the demand for applied research and technology transfer. Higher education and research institutions have a role to play. In most cases, their activities are governed by national legislation.

The science park must create an environment in which research centers are open to requests from companies concerning research, expert appraisals, or technology transfer. This calls for participating in discussions with these centers to make them aware of the stakes and to set up procedures for meeting companies' requests. The park can also work toward the creation of appropriate facilities and services in cooperation with the research centers on the site or in the surrounding area. For example, a science park may bring together project partners from a technology transfer center, an innovation center, or an innovative enterprise incubator[23]. The science park's coordination team engineers the project, raises the necessary funds and defines a development, organizational and management procedure for the facility in question. There are many relevant examples in Europe; an original and interesting one involved the creation of a regional innovation and technology transfer center in the agro-foodstuffs industry (CRITT Agrotec), which played an instrumental role in the development of the agro-food technology zone in Agen, France[24].

23 The technological incubator in Reunion was set up by the science park. **24** The Agen agro-food technology zone is often seen as a shining example of a science park in the agro-food industry in France. This proves that medium-sized agglomerations can gain a firm foothold and a solid reputation in activity niches.

4 Enhancing the innovation environment

4.1 Managing the flow of projects

On an operational level, it is important to have a full-time coordination unit – for communication procedures and development of a support program for company creation – and to engineer projects.

Project engineering involves:
• identifying technological development projects within or between companies or in research laboratories;
• mobilizing the skills, expertise and resources needed to define an action program within the framework of a project management operation;
• supporting the implementation of the project through specific coordination measures.

Project management methods usually include a design phase comprising the definition of objectives, the implementation of these objectives into actions, a study of the sequence of actions, and a description of the actions. This is followed by a quantification phase involving a quantitative study, planning, and budget evaluation. Finally a management phase includes planning, monitoring of actions, and coordination.

A science park coordination team spends a good deal of its time speeding up projects and facilitating their implementation. Projects can be of all sizes, but they mainly deal with innovation processes and the facilities and services that advance them. For example, a technological incubator can give rise to a project to define test equipment for the construction industry or develop a resource center for management of renewable energy.

A project engineering strategy can be implemented before the park's infrastructures and facilities are developed. This concretizes the science park's role, by facilitating contacts between companies and research centers or training organizations. Project engineering cannot be improvised; it requires hands-on experience, especially in combining the skills of highly varied organizations and companies.

Finally, science park coordination teams are asked not to supersede project support procedures implemented by other organizations, such as chambers of commerce or trade associations. Instead, they are asked to take them into account, as they can help meet the needs of the main science park players (companies, research laboratories, etc.). In this case, the science park's coordination team acts as a leader for existing skills networks.

4.2 Managing and evaluating the activities of a science park

The management of science parks and technopoles is more a question of experience and know-how than of knowledge and theory. The park will only start to run itself and assume its role as an innovation center when the development plan is approved and the charter is signed by the main institutions. Evaluation procedures then need to be put in place to optimize the science park's programs and performance.

In a science park, running partnerships, building up a solid relationship between companies and the different scientific and technological skill centers, and changing behavior and working methods are everyday challenges.

Monitoring technopole development programs, implementing communication plans and policies to support the creation of technological businesses, coordinating the science park and engineering projects: all these things require hands-on experience. Furthermore, as each project is unique, science park managers must build up their experience on the job. Nonetheless, it is important for them to be able to refer to best practices.

In addition, as in all business projects, science park managers must draw up an agenda: define the strategic plan, sign the implementation charter, establish the coordination committee, implement a promotion and communication policy, etc. However, the multi-faceted and multi-institutional nature of these operations can make this slightly more difficult than in other economic development contexts.

Furthermore, it is important to define an evaluation method and appropriate criteria from the outset. These are strategic management issues. They can be adjusted over time, but they must, above all, be shared by the activities being promoted and developed, and approved by all the science park partners. Indeed, the evaluation process must act as a link between science park actors and the public and private institutions running the operation. Its criteria must be simple, relevant, both quantitative and qualitative, and constitute a guideline for a project's progress.

The initial criteria will be qualitative, as the goal is to build a relationship between players who are not used to working together. Once the operation is more established, attention can turn to the number of square meters sold, the number of companies that have set up offices on the site(s), etc. These quantitative data will result from intangible processes triggered by the science park. The following criteria may be applied:

• the number of innovative companies created owing to the science park's services or facilities, as a proportion of all the newly created companies in the metropolis or the region;
• the number of new graduates working in companies in the science park;
• the number of company/university cooperation programs (research and training contracts, etc.) or the number of technology transfer operations initiated by the science park;
• the number of companies approached and the number operating in the science park;
• the number of companies attending events organized by the science park such as breakfasts or conferences and their level of satisfaction.

In practice, it is always difficult to distinguish between the advertised and the actual operations of a science park. A communication plan which anticipates future achievements to a certain extent can make the operation more concrete and thus trigger plans to develop projects among companies and researchers. All science parks use documents that present future achievements. This enables them to explain what the science park will be like once it is fully operational.

4.3 The business model and the financial risks inherent in a science park operation

For a science park, the return on investment is very long-term and takes a wide variety of forms, some of which are difficult to quantify.

The management of this type of operation does not generate the sort of income that can attract a private investor. The participation of public institutions interested in direct or indirect spin-offs of the project is certainly necessary; however, private investors and operators must be allowed to take their rightful place in the implementation and running of certain parts of the program.

The balance sheet of a technopole is often negative: the return on public investment can be seen in the jobs created, the extra tax revenues generated, etc. Massive and continuing public funding is necessary[25], especially for:
• research and technical training;
• infrastructure development;
• interface structures such as incubators or transfer centers;
• rental property programs, to pave the way for a private market.

Science park and technopole business models are based on the creation of a solvent market for private investors through public funding of infrastructures, installations, some technological facilities, initial fittings, advertising activities, network and business park coordination, etc.

Hence, as far as real estate is concerned, it is important to develop from the outset financing solutions involving both public partners and private operators. Once the product has been put on the market, it will be possible to sell it on to private investors or a management company. In the long run, the aim is to let private investors run real estate operations and generate a return on public investments.

25 For example, the investments required to launch the following operations were:
• 60 million of public funds to launch the Saint-Laurent technology park in Quebec (for an initial phase involving 60 ha); these investments covered the costs of land, infrastructures, marketing, etc;
• The public sector has invested EUR750 million in Sophia Antipolis over 25 years, for 900 ha of land (out of a total of 2,400 ha). Estimated profits stand at EUR250 million (charges on land). The annual income generated by business tax is around EUR30 million. These investments have created the right conditions for attracting private investment. Sophia Antipolis delivers around a 9% rate of return on real estate investments;
• The total cost of the Reunion Technology Park was EUR30 million (excluding superstructures) for a total area of 36 ha and an expected 150 companies. This was covered by public grants.

4. Enhancing the innovation environment

For example, there is no business model that allows the coordination structure to make a profit from services provided. Science parks operating within a metropolis have an annual coordination budget of between EUR 150 000 and EUR 1 million, depending on their size and age. New projects usually generate more expenses relating, in particular, to wages, travel costs, communication, fees (accountants, experts, etc.), overheads, and information technology costs.

Development and infrastructure operations appear on the science park's balance sheet but do not concern the coordination structure. Owing to the differing nature of development and coordination activities, their respective budgets must be handled separately. Nevertheless, the success of a science park often depends on the quality of the communication between these two sets of activities.

The financial risks inherent in establishing a science park depend on the size of the project, its ambitions and its program.

The financial risks linked to the launch of a science park project that is rolled out phase by phase (after the successful marketing of a first section of land or property) are lower than those involved in opening up several hundred hectares all at once, developing university and research facilities, and launching a costly advertising campaign targeted at companies.

The ambitions of a science park must always be in line with market surveys, and with the chosen strategy and concept. Furthermore, these operations take time – at least ten years to complete the first significant phases of the project. It is important to keep all options open with regard to infrastructures and facilities, as some may become obsolete as a result of the waves of technological innovation that sweep the market and the new scientific and technical knowledge that fuels the economy every ten years or so. It is therefore wise to keep possibilities for upgrading in mind and to keep land in reserve to allow for significant future development if market conditions are favorable.

Financial constraints may also lead sponsors to change the nature of the science park, if they cannot pay off the cost of the land over a long period of time. Meeting the need for areas for more traditional activities is one way of reducing these financial risks. In fact, no technopole is solely technological; a balance must be found between financial constraints and the specific characteristics of the project.

Finally, the financial risks are higher when the operation is overly ambitious in relation to the market for accomodation for technological companies; a technopole that is half empty indicates that the preliminary studies were inadequate. Investing in reliable expert appraisals beforehand limits these risks and ensures that the infrastructures and facilities developed are economically viable.

4.4 The stakes involved in technopole governance

The development of science parks has led to a new conception of public intervention. Science parks combine favorable locations with networking and cooperation programs that stimulate innovation; they require a wide variety of players willing to remain independent and further their reputation, while cooperating on new themes to meet new challenges.

The system of governance of metropolitan science parks aims first and foremost at people and projects, with the necessary resources and facilities being allocated subsequently. It does not aim to manage directly but rather to foster scientific, technological, economic, urban, and social creativity by offering a combination of working space and land and an ability to bring people together around a project and to coordinate public interests with market requirements.

In a metropolis, a science park policy can become a lever for and stimulate the development of projects on new themes relating to knowledge and innovation. Where a metropolis endeavors to coordinate its economic development tools and enhance their professionalism and efficiency, the science park acts as an innovation incubator in various areas of activity. For example, it can issue calls for tender on new themes, try to put together a critical pool of resources for each project, and maintain a close eye on socio-economic needs. Under these circumstances, the scope of a science park is huge. It can, in particular, be expanded to include the leisure economy and personal services and health care in the broad sense, which requires cooperation between companies and research laboratories. In this way, science parks are often closely linked to broader community development initiatives (see examples in Box 1.3).

Box 1.3

Science parks and estates and spatial planning

Laguna Technopark in the Philippines will eventually form part of a new regional growth center being developed by Ayala Land. Called Ayala South, the master plan will integrate a business district, commercial centers, residential villages, and community facilities on over 2,500 hectares of prime property.

South of the Ayala site, in Batangas Province, the LIMA Technology Center integrates industrial sites with over 100 hectares of commercial area and a residential development zone. The project is to create a complete township in which a fully-fledged commercial and retail center and a residential subdivision complement the industrial estate. Bordering the industrial zones, commercial and residential areas will cater to the needs of all LIMA citizens. Shopping areas, business and food centers, and entertainment complexes will round out the options available at LIMA. There will also be an international school, church, and medical center to take care of the needs of LIMA's citizens.

In Thailand, Amata Development has planned a similar community in the Eastern Seaboard area southeast of Bangkok. The company's aim is to integrate industrial estates with employee housing, commercial areas, educational facilities, and other social amenities. The first Amata City project is essentially a large industrial estate with a narrow strip of land along the entrance road for residential and commercial development. The property does not incorporate sufficient land to create a true community. Development of this project was hit by the 1997 Southeast Asian economic crisis and has remained on a slow track.

In metropolises and regions, governing bodies that manage science park projects can have different objectives: for instance to provide a location for technological companies near to higher education and research institutions; further the development of the metropolis by creating an innovation center in order to communicate its practices and ambitions to a variety of sectors. Although some regions have adopted such an approach, it is mostly implemented through networks and clusters, and rarely through science parks. New opportunities have been created by metropolis and regional development policies.

Conclusion

As long as there is good enough cooperation between levels of government, science parks are essential instruments for disseminating innovation as well as research results in surrounding local economies and metropolises.

In the knowledge economy, "success will go to those economies that are the most capable of attracting and rewarding talent, i.e. those that have the best training and research potential and the ability to foster innovation as widely as possible in both the private and public spheres"[26].

Although the changes expected in all aspects of training and research will mostly be brought about by government, local economies have a natural role to play insofar as the changes will no doubt confer greater autonomy on local institutions. Indeed, the attractiveness of metropolises is already, and will increasingly be, contingent upon the quality of their training programs and research, and their ability to influence their economic and social environment. Science parks can serve as a means of furthering these goals.

26 See "L'économie de l'immatériel, la croissance de demain", Maurice Levy, Jean-Pierre Jouyet, report for the Ministry of the Economy, Finance and Industry (France), December 2006.

CHAPTER 2
STRATEGIC POSITIONING OF SCIENCE PARK

Highlights

The definition of a technopole's or science park's "market" is multifaceted: it includes people, institutions, and companies. They are at once buyers/clients (they invest, they rent space in the incubator or the industrial area), free users (they benefit from the local and international social networking, they buy services from other local firms and from universities located in the park), and partners (they collaborate with other buyers/clients and with the science park itself to develop collaborative projects).

Although there is no standard recipe for the requisite ingredients, the interactions and the knowledge transactions facilitated by the technopole should derive new economic and competitive value from the three main functional components:

• **Knowledge providers:** Technopoles are always directly or indirectly associated with the education sector through universities – the primary source of trained human and intellectual capital – or through public or private research centers / laboratories. They share common objectives such as providing a training ground for entrepreneurs and supporting technology-led entrepreneurship based on university or laboratory research results. In fact, universities and R&D institutions play a crucial role in parks and technopoles as drivers of continuous education, new knowledge and trained manpower;
• **Industry support services:** These include incubators and enterprise development areas, usually managed by private operators;
• **Financial support services:** These include venture capital, regional development agencies and banks.

Laying the foundations of a self-sustaining science park is a difficult but not impossible task. Private investors should be aware that returns are not to be expected in the short run but that the acquisition of shares in the park may give them influence and enhance their reputation.

This chapter uses examples from around the world to present a variety of business models, approaches, and strategies for increasing a park's self-sustainability as well as practical tools commonly used by science park managers.

I. Practical tools and instruments for supporting and implementing the positioning process

To position the park appropriately, it is necessary to identify needs, to set up a mandate, and to define objectives. The most useful techniques are:

• Needs assessment: This program planning tool involves a systematic exploration of the way things are and the way they should be, on the basis of focus groups, in-depth or key informant interviews, community forums or public meetings, and surveys;
• Gap analysis: This measures the gap between the company's or organization's current and desired situation. Gap analysis can be very helpful for determining a global strategy to reach the park's objectives;
• Technology foresight: This systematic process visualizes science, technology, industry, economy, and society in the long run in order to identify technologies that can generate economic and social benefits. Technology foresight aims to look at present science and technology and to project hypothetical future economic and social developments;
• Road-mapping: This helps achieve effective project portfolio development and management by providing a framework for organization-wide technological strategic development and technology assessment, as well as division-level project evaluation and strategic aligning.

II. Practical tools and instruments for facilitating consensus building

The European Awareness Scenario Workshop (EASW) facilitates the exchange of knowledge, opinions, and ideas among stakeholders; identifies similarities and differences in the perception of problems and possible solutions; and stimulates political debate in local communities.

III. Practical tools and instruments for strengthening technopole sustainability

Financial planning involves the following tasks: assessing the business environment; confirming the business vision and objectives; identifying the types of resources needed to achieve these objectives; quantifying the amount of resources (labor, equipment, materials) deemed necessary; calculating the total cost of each type of resource; consolidating costs to create a budget; identifying any risks and issues involving the budget.

IV. Practical tools and instruments for attracting and assessing projects and opportunities

Every science park or technopole stakeholder has to contribute to the overall effort to attract new projects and opportunities. In support of this function, the technopole can use the following tools:

• Technology matching: This electronic tool aims at sharing and accessing knowledge, through a common electronic infrastructure for accessing and distributing technological information and resources;
• Knowledge market: This allows participants to compare what is on offer and learn more about available products and services. It engenders competition and innovation and fosters cooperation among suppliers to address common concerns;
• Investment appraisal methods: The range of methods can be categorized in two ways: traditional methods and discounted cash flow techniques;
• Partnership building tools: These offer guidance on identifying potential alliance partners; facilitating a dynamic and helpful kick-off meeting; creating an appropriate memorandum of understanding. They also help to attain the partnership's goals.

1 The positioning of science parks

1.1 Introduction

Science parks are major elements (or policy initiatives) of long-term plans to respond to territorial needs.

Science parks can be defined as structured communities or resource centers dedicated to the development of innovation. Considered powerful tools for regional development and economic transformation, they usually group in one location or region (a network of technopoles) the components needed for innovation: universities, research institutions, and enterprises. Most importantly, they rely on momentum and the long-term vision of community leaders. The "soft" aspects (i.e. scientific knowledge, social consensus, entrepreneurship) are as important as the "hard" ones (infrastructure, technology facilities, R&D investments). This dualism is part of the challenge of setting up a technopole.

Any new economic initiative that faces potential competition seeks to address the needs of a specific target market in an original way. Therefore, identifying the needs of potential recipients – those not yet (or not adequately) addressed – is the principal task to be carried out before setting up an organization to fulfill those needs.

1.2 Positioning the science park within the region

The positioning of these parks should be in line with the territorial strategy of the government in the area in which they are located.

The purpose of a science park is to develop facilities and services to support the creation of new companies, from the identification of entrepreneurial talent, market opportunities, and technological openings to the marketing of commercial property. All these activities may exist in a metropolis but may be scattered and not directly linked to technopoles: Silicon Valley has around 2.5 million inhabitants and all these activities, although there is no science park structure as such[1]. These activities exist if there is sufficient demand for them. For example, capital risk companies generally operate across areas much bigger than a metropolis, in order to have a sufficient number of projects to finance. On the other hand, an incubator must meet the local need for company creation. In any case, the absence of a science park structure does not mean that technological development in Silicon Valley results solely from local market forces, without any collective or cooperative action: the "governance" of clusters is an extremely complex issue, involving many motivations and taking shape over a long period of time.
Finally, the main role of a science park in the innovation chain is to provide missing links and to showcase them in highly visible, pleasant locations. By providing such locations and services, the science park aims to increase the momentum of the innovation chain, for the benefit not only of companies, but also of researchers who are likely to see their work acknowledged and rewarded.

For example, in 2002, the City of Paris, under the direction of its economic development agency "Paris Développement"[2], chose to support innovation in three areas: software / multimedia, healthcare / biotechnologies, and design / creation. In each of these areas, Paris Technopole participates in the establishment of joint tools and services, which are used throughout the innovation process.

Greater Lyon[3] has three objectives: to reinforce collaboration between research and business (competitive clusters, incubator, cancer research cluster, showcasing of research, technopoles); to promote innovation in traditional companies, through information and communication technology (ICT) and updated practices (Lyon Numérique service package, Lyon Vision Mode); and to boost the international appeal of the University of Lyon (PRES Centre for Research and Higher Education, upgrading of campuses, recruitment of foreign researchers, etc.).

Marseille also aims to promote development through scientific and technological innovation. Many tools and procedures have been implemented[4], but need to be reinforced and no doubt updated owing to a number of key developments (on these points, see Annex 1 on different approaches to technopoles and science parks).

1 Technology parks act as development hubs for the entire region. **2** Agency based on a partnership between the City of Paris and the Paris Chamber of Commerce and Industry, chaired by C. Sautter, Deputy Mayor in charge of Economic development, Finance and Employment. See www.parisdeveloppement.com. **3** See www.entreprendre.grandlyon.com/ **4** See "Le développement économique par l'innovation", published by the DDEAI (Department of Economic Development and International Affairs) of the Urban Community of the Marseille Provence Metropole.

1.3 Effects of positioning on implementation

Positioning is the act of designing the organization's offer and image so that they occupy a meaningful and distinct competitive position in targeted customers' or users' minds[5].

Analysis of the internal and / or external demand / needs is the major source of information for the positioning process but other factors also intervene:
• Government policy priorities play an important role in determining the strategic focus of the science park (sector, technologies, development platforms) given that a sector's or region's financial schemes or incentives (see Section 2 of this chapter) may strongly affect the technopole.
• The presence of competing technopoles or similar entities in the same region or country may affect the decision to focus on a specific competence or sector, or indeed whether to set up the organization, in order to avoid redundancy.
• International regulations (new trading rules under the Uruguay Round agreement or new intellectual property rights [IPR] regulations) can affect technology flows, as a result of a country's overall risk assessment, and thus the positioning of a park.

In terms of supply of service, the park provides not only land and support services but also "neighborhoods".

The offer. The definition of the science park "market" is multifaceted. It includes people, institutions, and companies which are at the same time direct buyers / clients (they invest, they rent in the incubator or in the industrial area), but also users (they benefit from local and international social networking, they buy services from other local firms and from universities located in the park) and partners (they work with other buyers / clients and the park to develop collaborative projects).

The direct products of the parks – the available technological infrastructure (see Boxes 2.1 and 2.2), suitable rental spaces, the quality of the available support services – are the most tangible products, but not necessarily the most important for the customers and the users.

Box 2.1

A science park's originality is reflected in its infrastructure supply

The science park can develop a positioning strategy which emphasizes the energy-friendly design of the infrastructure and the buildings. Parks often position themselves as key players in the renewable energy field and support initiatives such as: incorporating passive solar building design to reduce heating/cooling requirements; using integrated renewable energy sources, with the parallel benefits of high quality and reliability of supply; building to rooftop capacity and feeding surplus energy into the grid at green energy premium price; providing tenants with guidelines and support for energy efficiency in building and process design; optimizing carbon absorption in the landscaping; greatly reducing the volume of pollution and waste which need to be treated and removed; and reducing impacts of employee transportation through renewable energy or hybrid van transportation, car pooling and disincentives for parking. Responses from potential customers / investors to measures having a strong social and environmental impact can be very significant and can increase tenants' long-term commitment.

5 Philip Kotler, Marketing Management, Prentice-Hall 1987.

1. The positioning of science parks

Indirect products (availability of talent, level of public and private transportation, access services, international networking events, and leisure facilities) are also an important attraction. They affect the science park's positioning but do not require direct productive investments from its shareholders.

Basically, science park managers must decide on the position they want the park to occupy. The park should not seek to close every gap but to be distinctly better in fields linked with its market values.

Box 2.2

Technopole segmentation in Tunisia

The Technical Assistance of the European Investment Bank (EIB) in Tunisia, following the stakeholders' inclusive approach, developed two main operational approaches:
1) Technology-push technopoles, i.e. those that have shown their capacity to generate interactions between research centers and companies in certain technological fields. Universities and research institutes play an important role in their strategy.
2) Market-pull technopoles, i.e. those with a high concentration of industrial companies that generate high demand for R&D support. Core activities are based on the involvement of technical centers, industry associations, chambers of commerce and employers associations.

A science park's competition strategy needs to be based on its comparative advantages. It should encompass the surrounding region and take account of its effect on the local environment.

Competitive position: Competitive strategies should be based on an evaluation of science parks' relative comparative advantages. For example, Park A has five possible platform options: R&D, research and engineering, training, incubator, and production area. If Park A's main competitor, Park B, is an international park located in a neighboring country, and if it performs well in R&D and research and engineering, albeit at high cost, while the incubator service and training facilities are average and production costs too expensive, then park A cannot afford to compete on research but should seek a competitive position based on cost and excellent service linked to the production area. Incubator services should be enhanced to attract new companies and start-ups based on a better value for money model (Table 2.1).

Table 2.1

Example of strategic choices

Competitive Advantage	Park A	Park B	Affordability and Speed	Recommended Action
Incubator	8	6	H	Invest
Training	6	6	M	Hold
R&D	7	9	L	Monitor
R&E	7	8	L	Monitor
Production area	8	4	H	Invest

10=high score;1=low score; H=high; M=medium; L=low.

Experience in developing countries has given increased awareness of the need for science parks to be closely linked to their local economies. While recruitment of transnational corporations may provide significant numbers of jobs, it tends not to engender the higher level of development that expansion and incubation of local firms can achieve.

Therefore, science parks should position themselves according to locally available skills and industrial strengths (sectoral specialization, see Box 2.3). This positioning should result in a proposal based on local values and competences in a chosen sector, thus enhancing the attractiveness and the development potential of regional firms.

Box 2.3

Science parks and specialization

A 2002 survey by the International Association of Science Parks found that the specialization focus areas of science and technology parks are broken down as follows:

- **27% are "generalists" and accept companies and activities from many different sectors and technological fields (as long as they meet the park's admission criteria).**
- **25% are "specialists" and were conceived and designed for one or more specific sectors, such as biotechnology or ICT[6].**
- **48% are "focused generalists" and were initially conceived as generalists (and in many cases officially remain so), but have gradually become more specialized.**

Target users matter. Parks do best when they define their targets carefully and prepare a tailor-made positioning strategy.

Science parks or technopoles have no optimal size. Size varies from case to case, and there is no "one size fits all" solution. The size of the park must take into account the reality of the country or region and be in line with the park's strategic positioning. The most successful science parks match their offer to the needs of the local stakeholder community. Studying the region's entrepreneurial climate, measuring the community's business development needs through feasibility studies, and identifying potential beneficiaries can help determine the appropriate configuration (or at least recognize when a project has little chance of success).

1.4 Main components of science parks

Knowledge providers and industry support and financial services as well as firms are located in science parks. This diversity is necessary but the optimal mix is difficult to define.

At the heart of the park, there is a combination of physical facilities and a well-balanced portfolio of service providers to support the creation of a collaborative environment in which the three major components can generate new value.

Science parks and technopoles are always directly or indirectly associated with the education sector through universities – the primary source of trained human and intellectual capital – or through public or private research centers / laboratories. They share common objectives such as providing a training ground for entrepreneurs and supporting technology-led entrepreneurship based on university or laboratory research results. In fact, universities and R&D institutions play a crucial role in science parks as drivers of education, new knowledge, and trained manpower. In particular, university students and faculty may collaborate with park companies through student internship programs and part-time jobs, company creation by faculty, and research partnerships.

6 An interesting example is the Bizerte technopole in Tunisia which is based on agro-food industries. Its main business concept and mission is to act as a hub for exports and services.

1. The positioning of science parks

The physical facilities and the services offered are expected to enhance the competitiveness of tenants (researchers, firms, start-ups) that move into the park. A well-balanced quality-price matrix of the facilities and services on offer is crucial in terms of the science park's purpose-built infrastructure.

Physical and technical infrastructure, specialized infrastructure and key support services should interact and allow the park to adapt to changing market and technology scenarios.

Physical and technical infrastructure
Location is one of the most critical decisions in the positioning strategy. The park should be close to an urban or metropolitan center and endowed with education, conference, and telecommunication facilities. Purpose-built, multi–tenant buildings incorporating modules of different sizes and access to specific centralized services are also an important physical facility.

Industry-specific specialized infrastructure
Depending on the technological or industrial scope of the science park, the technical infrastructures may include advanced telecommunication systems, prototype and pilot production, testing facilities, tool development laboratories, calibration laboratories, and environmental testing.

To attract leading players the planned infrastructure should incorporate the most recent technological advances in the industry. The decision about the range and quality of this kind of investment will affect the overall attractiveness of the park.

Key support services
Park and technopole clients include technology-intensive small and medium-size enterprises (SMEs), as well as large companies (tenants) all of which require a range of services particularly in the early stages of project development. The range, quality, and cost-effectiveness of services are a key positioning tool vis-à-vis prospective tenants. Support and advisory services are expected to include marketing, contractual, and legal issues related to technology management and collaborative projects such as:

- Screening of new business opportunities, technology trends and foresight;
- Management of collaborative projects, patenting and IPR;
- Market development (business plans, road shows, international missions);
- Match-making between tenants and clients;
- Easy access to project finance (grants, loans, equity financing);
- Training, seminars and workshops for capability building;
- Facilitated recruitment from universities;
- Networking events;
- Service focus on support for start-up firms under the incubator program.

The components should be organized so as to enhance firms' competitiveness through innovation: fostering multi-partner research and industrial development programs (collective projects, structured thematic initiatives); creating spin-offs; adopting available project financing schemes. Hence, attention should be given to the development of science park "service platforms" in addition to the hard technology facilities (large-scale plants and equipment). For example in the Kyeongbuk technopark in Korea, services that support start-ups and incubated enterprises are under one roof and facilitate their interface with established and dominant companies.

The science park sustains a mutually supportive learning community of entrepreneurial tenants who find common ground in project generation. The management plays a strong role as catalyst in the project generation process.

1.5 Role of the science park's management

Collaboration is a cultural "must" in any technopole context and as such it is to be encouraged and reinforced among tenants, researchers, higher education institutions, companies located in the technopole and between them and those located outside the technopole's physical facilities. The park's management needs to develop effective initiatives to create networks, alliances, partnerships, and growth opportunities with other technopoles, universities, and research institutes elsewhere in the world. The launch and follow-up of these collaborations is the true source of competitive advantage for the park and a major assessment criterion.

To generate dynamic projects[7], the park's management must provide support for building partnerships and identify financial schemes to promote and consolidate cooperation. It should help to enhance all possible synergies and mentor project stakeholders and science park tenants.

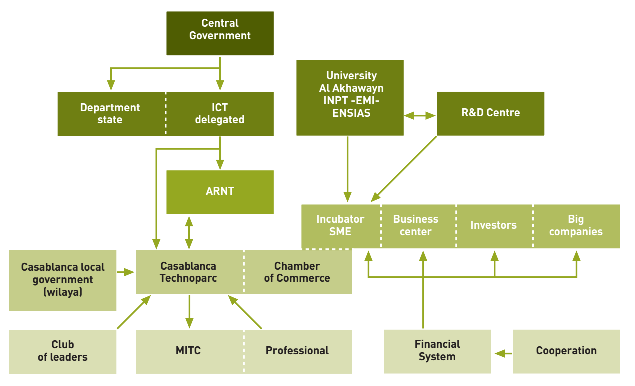
However, it should be taken into account that investment in "soft" factors will bring returns only in the medium to long term. This leads to the issue of sustainability, which is dealt with in Section 3.

In addition, it should be noted that management interventions should not be overwhelming: innovation dynamics require the creation of a culture of change and risk taking. Entrepreneurship and talent are crucial for the prosperity of the technopole (the declared mission of the Casablanca Technopark is to enhance entrepreneurship; see Figure 2.1)[8].

Government policies can help to frame a local environment favorable to the success of parks but they do not guarantee strong performance.

Figure 2.1

The Casablanca technopark stakeholders
Transmission and creation of knowledge-transfert to the economy



7 By project is understood any economic initiative, the objectives of which are shared and which is to be achieved in a collaborative mode by a community of stakeholders, for the benefit of all. **8** Casablanca Technopark is the second technopark launched in the Maghreb region, after El Ghazala in Tunisia. It is dedicated to the ICT sector. Its success is based on an essentially private-sector management, although the government played the main role in its initiation and launch. It has attracted key players in the ICT sector (Bull, Sagem), its occupation rate is close to 100% and it is a private technopark integrated in an urban network, with robust innovation dynamics and good visibility for the private sector.

1. The positioning of science parks

1.6 Government policies that affect a science park's positioning

Policies to influence science parks and technopoles include:

• Top-down initiatives, linked to industrial and research policy, wich target both national and regional goals. Examples include: the Korean Five-Year Plan for Balanced National Development and the technopark program[9], the VINNVAXT regional growth program and the stimulation of dynamic innovation systems in Sweden, the Center of Expertise and the strategies for developing regional innovation systems in Finland, the National Plan of Tunisia Technoparks Network[10], and many others. The top–down approach requires analytical efforts to create a value proposition based on regional competitive assets (industrial, scientific, infrastructural, and business environment strengths).

• Bottom-up programs, such as the Dutch innovation platform and Italian industrial districts, which are often supported by national and regional policies through specific financial and policy schemes but are not always integrated in the economic development policy framework. An enabling environment (collaborative projects, infrastructures, networks) can help pave the way for robust science parks.

To be effective, policies should consider the appropriate timing, undertake accurate resource planning, take a long-term perspective, and recognize the need for a sustained financial commitment: experience shows that science parks require a regular influx of money often over a lengthy period of time.

However, although it is an essential support factor, policy support is not the only important factor in a park's success:

• **Excellence in science is important** but the research base has to be linked with locally based industrial value chains if it is to result in commercial and market success.

• **Local champions with self-organizing capacities** can considerably enhance the park's potential and increase its chances for engagement in cross-fertilization and multidimensional innovation.

• **The human factor plays an outstanding role in park development**. The motivation, competences, dynamism, and entrepreneurial spirit of park personnel are decisive. Therefore, particular attention needs to be paid to recruitment processes, continuous training, and the reward system of the science park management staff.

9 In 1999, the Korean technopark construction program started to set up regional innovation clusters by networking local universities, innovative SMEs and start-up companies and invested KRW 400 billion for 14 technoparks across the nation. **10** The Government of Tunisia identified 12 science parks as the cornerstone of the country's innovation policy. Each specializes in a different sector and brings together education, an industrial zone, research, technical experimentation and an incubator. So far, some technoparks have been successfully implemented, yielding spin-off activities and hosting important multinationals.

2 Consensus building in positioning strategies

2.1 The rationale of a participative approach

Stakeholders should be involved in positioning the science park strategy from the outset.

Broad community support and participation is a significant factor in the success of a technopole. It is therefore important to include leading actors and groups from the community when developing the positioning strategy. The science park should seek to balance the interests of all major stakeholder groups including the region's or city's principal bodies:

- Leaders of the city's industrial, scientific, and financial community;
- Representatives of firms, associations and potential tenants;
- Public sector stakeholders from city, regional, and national government;
- Community organizations, higher education, and academic institutions.

Quite often the stakeholders initially involved in the design of a science park or technopole have only a rough idea of what is involved. Therefore, informing the stakeholder community early is of paramount importance, as it defines the mission, the available resources, and the modes of functioning. Learning to share views and objectives are very important cultural steps.

In order to ensure their support throughout the process (and especially during implementation), stakeholders need to participate in the definition of the park positioning strategy and share a sense of ownership of the initiative.

A kick-off workshop or conference, at which stakeholders can learn the basic principles of science parks and assess their impact on local development patterns, is useful for launching the planning process (see Box 2.4).
Other possibilities include networking with key individuals and institutions, organizing public events with media coverage, conducting seminars and linking them with activities in universities.

Box 2.4

Preparing science park stakeholders in Tunisia

For the launch of five technopoles in Tunisia in 2006-2008, the EIB's Technical Assistance undertook consensus building and carried out strategy seminars at a very early stage.

When the IN'TEX Network was set up at Monastir in March 2008, it immediately led to the creation of a motivated group of over 50 stakeholders. At a second meeting a number of innovative "pre-projects" were presented by four thematic working groups (fashion, quality / energy, technical textile, and ICT), involving firms, university research, and education, with shared objectives: skills analysis of the network members, formulation of the strategic axis, prefiguration of the network structure.

The same approach is followed in Bizerte. The action plan of EIB's Technical Assistance emphasizes a prospective, participative, and operational approach. The approach is bottom-up, with consultation of leading operators and key institutions for the development of specifications and support for the project. It compares the viewpoints of the actors involved in launching the agro-food technological park and their coherence with the strategic analysis of the agro-food sector and the orientations of the Ninth Tunisian Plan.

2. Consensus building in positioning strategies

2.2 Possible technical approaches to foster inclusiveness

Defining the strategy requires a good knowledge of local assets and resources.

During the early stages of defining the technopole, it can be important to establish an inventory of resources available at local, state, and national levels in order to facilitate networking and mutual understanding among stakeholders[11]. These may include competences, organizations, sources of information / data, and other assets that can support the science park project. A survey of existing local resources should address the following questions:
• Who does what in terms of innovation and research in the region?
• What are firms' basic needs?
• How can existing training programs and public incentives contribute to development?
• What are the resources already in place?
• What types of financing are available?
• What organizations or businesses could make in-kind contributions?
• What are the local offerings?
• What are the research capabilities?
• Are the necessary education and training programs in place?
• What existing and past plans is it possible to build on?
• What are the opportunities for community involvement?

The survey should cover economic development, finance, environmental protection, urban planning, community development, and education / training issues. It should identify missing inputs for developing the science park as well as options to supply them.

2.3 The follow-up process

It is important to revisit and renew the vision behind the strategy through workshops in which all current stakeholders can participate.

The next step is to integrate the input obtained by stakeholders into a compelling and shared vision of the science park. One of the most important elements of this vision is a clear mission statement. A clearly articulated mission will guide daily practice at all levels of the technopole and give all stakeholders a set of social and economic performance objectives to reach.
Groups often follow a backward-looking mode to develop the vision. However, science park members should adopt a forward-looking perspective and identify the key strategies to pursue to promote innovation and improve performance.

In conclusion, the creation of a technopole, with its influx of people, new institutions, and businesses, is an institutional and managerial challenge. It requires **the committed participation[12] of the local scientific, industrial, and social community[13]**.
• Ensuring the support of local stakeholders is essential. They should **share the same view** of the park's market positioning and of how local intangible assets create value (see Box 2.5).
• To encourage local participation, a public-private partnership (social pact) should be negotiated which reflects agreed long-term cooperation goals and a shared vision.
• Effective communication to the public and transparent evaluation of the technopole's economic and social outcomes are important management tasks.

11 The stakeholders of the technopole are the members of the local community as a whole, but the university, research staff, business organizations, the government, local government authorities, and the banks play a particularly important role. **12** Casablanca Technopark in Morocco and Valencia Foundation Technopark in Spain are interesting examples of the effectiveness of open participation. **13** One of the main factors in the success of subnational innovation systems (SIS) policies in Germany is the broad consensus among regional stakeholders regarding their region's techno-economic priorities, their endogenous technological potentials ("regional strengths"), and the overall implementation of SIS policies (this includes the ability to attract funding from supra-national organizations).

Box 2.5

The Bentley technology park in Western Australia

Since the 1970s Western Australia's Bentley Technology Park has grown substantially and been very successful. According to the stakeholders involved in the establishment of the park, several factors have contributed to its success: a vision shared by the private sector, the state government, and the Curtin University of Technology; a dedicated management team; a public-private partnership which delivers added value to companies by helping them access new markets and create joint ventures abroad; financing (in 1985 the Western Australian State Government invested AUD 12 million in real estate and the private sector has since invested more than AUD 150 million in building projects); the business incubator – Entrepreneurs in Residence (EiR) – which gives access to a seed capital fund; and building on past success and consolidation (the region's technical expertise not only supports further development of natural resources but can also create new wealth based on intellectual property).

Reaching consensus is necessary in order to articulate a vision and build the strategy. This process is facilitated if the division of roles between stakeholders is established and there is continuing dialogue among them before the start-up process.

Consensus building

Given the complex and long-term nature of research and innovation, the science park's management plays a key role. As in any business organization, management aims not only at generating results but also at harmonizing the different views of stakeholders. This is why strategic positioning is so important. The process is sustained by:

• A **rigorous positioning analysis** before the start-up phase, followed by a period of trial and error, and a prudent approach to public communication to avoid suggesting overly optimistic short–term results.

• A process of continuous consensus building and follow-up to encourage **joint participation and investment by public and private actors**. During the start-up phase, some operational problems can arise, such as disagreements about the park's specialization, fundraising among participants, the organization's structure, or the selection of specialized businesses (see also Chapter 1).

• The **establishment of discussion forums** to facilitate the division of roles among stakeholders and achieve a common vision based on synergies generated from their different competences and skills:
- Universities should share their scientific and technological knowledge with the industries concerned, while focusing on creative ideas, human resources development, and applied science and technology transfer opportunities;
- Industries should cooperate on the innovation activities of local industry, make an active effort to create value from technology services supplied by universities, and maintain cooperative relations with researchers;
- The central and regional government should provide **appropriate policy support measures** to strengthen specialization strategies (market and business intelligence reports, incentives based on a coherent specialization policy, financial support, and a favorable tax system).

2. Consensus building in positioning strategies

A participative roadmap (the "social pact") based on the positioning strategy will help the science park management to maintain momentum and the necessary social consensus (See Box 2.6).

Box 2.6

Setting the scene for a public-private social pact

A public-private social pact is essential for the park's governance. The partnership must be built on a clear definition of rules, on the role of each party, and on companies' leadership.

A social pact is a long-term territorial cooperation agreement based on a consensus among the local (public and private) stakeholders. It can orient efforts to reach a common vision (definition of needs, definition of research programs). Communication to the public and transparent evaluations in terms of social and economic impact can support the park's long-term integration and policy commitment.

Source: Conclusions from the conference "Territoires métropolitains innovants: technopôles et pôles de compétitivité".

3 Sustainability of the science park

3.1 The crucial role of the science park management

Managing a park is similar to any other business or project management.

Whether it is industry-led or research-led (see Section 1), the science park has to combine the skills necessary to foster effectively regional development and to achieve an economically sustainable balance.

Reaching the goal of a self-sustaining science park is difficult but not impossible. Private investors should be aware that returns are not to be expected in the short run, but that the acquisition of shares in the science park may give them influence and enhance their reputation. The science park management assumes the normal functions of business manager (develop and further detail the original idea, carry out feasibility studies, define the demand and what the park offers, position the technopole in a specific target market segment, deal with and involve the authorities, source the appropriate public and private finance, brand the park and make it known) and that of a project manager (design, construction, commissioning and maintaining the physical, technical, and technological facilities).

Tenants are a major source of revenue for the science park either directly through the rent they pay and the services they use or indirectly through their capacity to link with other firms and institutions.

Generating revenue

The sustainability of a science park depends mostly on its tenants. This is the (often underestimated) key to a successful park. Tenants are the most important source of revenues from the use or sale of physical infrastructure (rent, use of telecommunication facilities, purchase of land or offices) and from access to technical (congress hall, training rooms) and technological facilities (testing, experimentation, and research). Tenants are also the most important marketers of the park's strategic approach and services. The types of indirect marketing provided by tenants include word-of-mouth with their suppliers, clients, and partners, feedback and references provided to potential entrants in the park, and their guests' perceptions of the park's infrastructures and services.

Sustainability requires:

- Prompt, effective, and professional communication of the services provided by the science park to new and former tenants;
- Identification and screening of potential tenants possessing the characteristics (reputation, growth potential, image) to be "ambassadors" of the park around the world;
- Continuous support to tenants' businesses and provision of specialized assistance aimed at generating tangible benefits;
- Establishment of technological infrastructure that meets the particular technical and marketing problems faced by tenants;
- A rich exchange and mobility program with tenants of other international parks and a prestigious training and conference program involving high-level experts and scholars from various parts of the world.

Park managers need to optimize park pricing policies while considering the constraints and opportunities of the local context and the need for balanced planning of demand projections and occupancy capacity of the available facilities.

Science park management should have mechanisms to facilitate revenue collection. The management should be able to set up differential pricing policies for start-ups or relatively small enterprises (lower charges, delayed payment terms, grants) and to design specific service packages to attract large multinationals (ease of access to facilities, testing, and intellectual property) (see Box 2.7).

The inability to meet sustainability targets can lead to financial difficulties and to a reduction in services to tenants. It is therefore crucial to plan carefully the park's management once the establishment of the park is decided.

3. Sustainability of the science park

Box 2.7

A business incubation model: Technopolis Ventures (TV)

TV is a company registered on the Finnish stock market. Its main activity is to provide incubation services. Its business model is based on physical infrastructures of good quality and on support services to help entrepreneurs deal with challenges such as scarce capital, elusive markets, intense competition, and limited resources.

Technopolis selects the most promising business ideas for its pre-incubation and incubation programs, depending on the stage and aims of the project. The pre-incubation program offers hands-on assistance in generating a business plan. The incubation programs support the implementation of the business plan and the development of operations. The packaged incubator services are divided into three separate packages (Standard, Pro, and Premium), which have been designed around the ambitions of the different start-ups. The higher the aim, the more comprehensive the service package. The programs take 12-24 months to complete. Most of the services are also available separately.

Source: Technopolis website, May 2008.

3.2 The business model

A science park may be either a fully public entity or a business type of undertaking but is generally something in between…

The business models of science parks worldwide are determined by the roles and goals of the stakeholders. They range between two extremes:

• Science parks funded by the government or by regional authorities. Economic return on property and other fixed asset investment is not the primary objective; the policy goals are industrial development, job creation, research / industry cooperation, economic growth, or environmental protection. In this case, local or national development bodies provide grants, soft loans, guarantees, or subsidies to tenants and companies locating their activities in the park. The role of universities as a key stakeholder is to undertake R&D efforts in collaboration with industry and raise private funds to support further technology development;

• A business undertaking in which a return on investment is the major goal to be achieved from sale of land, rental income, increased property values, or sale of technical services. Some science parks' strategic priorities are to ensure returns from land sales, rentals or services in order to recover part or all of their investment. Science parks privileging this approach expect to reinvest their profits in the facilities in order to keep them state-of-the-art.

The positioning of a park at one of the two extremes is unusual. Typically, science parks are positioned somewhere between the extremes and balance public and private interests. A mixed model or a public-private initiative is very common in the Maghreb. Under this model, initial funding of the expensive real estate and technical infrastructure is provided by public agencies or by the government, and the management of the park is handled by a private or a public / private company which also owns a financial stake in the park assets. This model ensures the management a certain degree of autonomy insofar as it achieves the stated social and economic objectives.

3.3 Public / private interactions

....which takes the form of a public / private partnership.

Most science parks originate as a result of an agreement of local partners, mainly public authorities and academic centers. The initiator is most often the regional or national government, a university / research centre, or an agency for regional development. Hence, a top-down approach is most common. A bottom-up approach is more characteristic of entities such as clusters or industrial districts.

The science park system includes firms, research organizations, and institutions in the public and private sectors, which interact to create, import, modify, transfer, and diffuse technology and innovation as the key lever for international competitiveness. The challenge is to create and sustain the relationships among these public and private organizations to ensure the flow of knowledge into innovation and development.

As a general rule science parks operate in the form of public-private partnership companies which adopt the following legal forms:
• Limited or joint stock company (see Box 2.8);
• Foundation;
• Association;
• Organizational unit directly managed by a university;
• A science park linked to a special economic zone (e.g. Krakow Technology Park, Bizerte Technopole).

Box 2.8

Egypt's smart villages company

This company takes the form of a public-private partnership (PPP). Its strategic aim is to foster the development of profitable chains of technology and business parks. The Ministry of Communication and Information Technology (MCIT) is a founding contributor. The parks are provided with world-class infrastructure and services for local and international companies wishing to benefit from their unique locations, state-of-the art infrastructure, and proximity to a highly skilled workforce. The support of MCIT, combined with the business incentive packages provided by the Smart Villages Company, attracts businesses from around the world. Since its foundation in 2001, the company has expanded the Smart Village in Cairo and in 6th October City. Construction of a third Smart Village in Damietta is scheduled to start in 2010.

This partnership is based on research platforms and locally based firms which are coherent with the science park's strategic positioning.

Due to the complexity of the projects, it is not always possible to choose the legal form in advance. Sometimes the decision is made during the construction and establishment stages. This is due to decision makers' scarce experience with such endeavors and the need to involve stakeholders. The legal form has implications for the range of financial resources available for the technopole. Apart from some services, science parks do not make large profits, and they often rely heavily on public support to balance their accounts. Many link their development opportunities to their efficiency in raising public funds for R&D and for regional development.

3. Sustainability of the science park

Because business attracts business, a strong involvement of business organizations in the park's early stages can reinforce the public-private relationship and move the science park toward an economically sustainable trajectory.

The public-private partnership model takes account of the following:
• In positioning the science park, it is important to identify emerging trends and research platforms and competences that need to be nurtured and developed in order to ensure sustainability;
• Research platforms should build on the strengths and historical manufacturing traditions of local industry;
• Public investments in research are not enough on their own. It is necessary to reinforce the innovation system and the interactions among the different components through innovation support services (networking, marketing support, technology development and transfer, financing, education and training, IPR assistance, and industrial commercialization of R&D)[14];
• Science parks should be capable of retaining the benefits of research and innovation and of engaging strongly in technology transfer to enhance the competitiveness of the local industry fabric;
• The long-term research and support services of science parks are key factors in their competitive positioning.

Science parks are characterized as leading-edge or followers depending on whether their specialization and comparative advantages are high technology or based on more traditional technologies.

A science park's strategy requires scientific and technical information in order to answer critical questions such as: "Where do we want to build the capacity to be leaders?" and "How can the strategy be used to gain further leverage through R&D and innovation, both domestically and internationally?" For technopoles these questions can be dealt with according to the standard industry categories of "leading-edge" and "follower".

14 The Thailand Science Park (TSP) is the first of its kind in the country. It was established in 2003 as a comprehensive service centre for S&T and R&D activities, under the National and Technology Development Agency (NSTDA) and the Ministry of Science and Technology (MOST). It is not specialized in a specific sector. It focuses on R&D activities with potential commercial applications; collaboration among industry, academic institutions, and NSTDA; and technology incubation services in electronics, material science, and biotechnology. The Government has a vision to develop TSP as Thailand's innovation-led technology cluster and has a plan to create several provincial science parks to promote local Science, Technology and Industry (STI) activities.

"Leading edge" science parks are endowed with large-scale resources, investments, and university/industry backing (see Box 2.9).

Box 2.9

Biopolis: A leading-edge science park

The USD 305 million biomedical hub in Singapore consists of seven buildings linked by sky bridges and an area of 2 million square feet. Two of the buildings house private biomedical companies. The other five accommodate outstanding biomedical research institutes, devoted to bioinformatics, bio-processing technology, genomics, molecular and cell biology, and bioengineering and nanotechnology. The campus offers various facilities to research groups and individual scientists, including electron microscopy, nuclear magnetic resonance, X-ray crystallography, histology, DNA sequencing, and the identification, sequencing, and determination of the weight of proteins. The shared facilities have particular value for start-up companies and small research groups because they allow them to reduce their overheads.

"Follower" science parks are usually located in developing regions and must be able to recognize and then rapidly adapt their focus to a changing environment and deploy an appropriately flexible positioning strategy (see Box 2.10).

Box 2.10

Software Park Thailand in Nonthaburi Province: A follower science park

The objective of this park is to stimulate the development of Thai industry by responding to a rapidly changing global digital economy. The park now houses over 50 companies, 17 of which have international business links, employ over 560 workers, collaborate with international software firms like IBM, Sun, HP, and Oracle as well as universities and the Thai private sector.

4 Project development and opportunities

4.1 Stimulating the flow of projects at incubator and incubator network levels

A key aspect of a science park's strategy is to enhance the flow of projects with a special focus on supply chain networks, collaborative projects and incubation initiatives.

Helping projects to move forward is one of the park's major missions and a key element of its positioning strategy. Its networking services are expected to encourage business relations between science park tenants through advice, cross-fertilization of ideas and links with business and technology actors in the surrounding environment. Major initiatives in this respect include:

• **Promotion of global subcontracting and supply chain networks**. This involves creating or consolidating commercial links with national and international production systems and global value chains in order to promote partnerships and integrate developing countries into the world economy, for example by matchmaking small and medium-sized suppliers with buyers in industrial subcontracting and partnerships;

• **Stimulation of collaborative projects**. Training courses, seminars, and conferences can help create project opportunities within the park. Indeed, an important mission of the technopole is to draw on the local entrepreneurial spirit. The science park can strengthen the regional innovation system by developing strategic regional businesses and specialized regional innovative networks;

• The science park can **facilitate the exchange of views and ideas about technical solutions between researchers and SMEs**. In this way, companies' product and process technologies can be upgraded and rationalized and new ventures can thrive;

• **Incubating young firms** is a major function of the park (see Box 2.11). The incubator not only provides office space for start-ups on an easy-in / easy-out basis but also offers a number of services at less than market price. It thus **creates a favorable environment for the expansion of often fragile new technology firms**. These services include financial, marketing, design support, and managerial training for tenants[15]. The internal dynamics of the networking that occurs in the shared physical space of the incubator also helps advance the projects under way.

Box 2.11

Incubators as core institutions of the technopole

According to IASP, 88% of technopoles have one or several incubators on their premises. Nearly everywhere, incubators are a very important element of a technopole's offer.

Many developing countries have implemented the idea of technology-based incubator (TBI). The TBI acts as an intermediary between research institutions and innovators. It serves as a catalyst for technology transfer, commercialization of research results, and entrepreneurial ventures.

Through the TBI, the start-up can take advantage of appropriate business services as well as seed capital or working capital. Incubators markedly increase the survival rate of research spin-offs and new technology-based firms.

The new science park in Beirut (Berytech) is a success story: set up in 2002 by a university and a few private stakeholders, it now has two sites: the Campus of Science and the Technology Campus of Medical Sciences. The business model focuses on selling incubator space and hosting videoconferencing and a training center. In just a few years Berytech has created over 80 projects / start-ups and 250 jobs.

15 General services provided in the incubator usually emphasize: technical support and access to facilities such as reception and mailing facilities, office equipment, meeting rooms; advice to firms on business planning, management skills, accounting, legal, marketing and financial expertise; and access to finance and specialist advice especially with regard to project financing.

Improving the competitive position and international standing of a science park will require efforts to enhance the quality and scope of its services, specific attention to its web portal, an appropriate selection of specialized niches, and a good location.

4.2 International visibility

Several parameters with a strong appeal to international observers help the science park to achieve a strategic international position:

Service
This positioning approach has been adopted by many technopoles. Whether the focus is on how staff interacts with stakeholders and customers, the physical environment in which services are provided, systems such as centralized facilities, online assistance, the pricing of transactions, or a distinctive service delivery model, the goal of this approach should be to establish the organization's reputation as customer-friendly.

Internet
Regions' and countries' web portals for technology transfer transactions, technology offers, and technology requests have increasing importance for parks. For example, the Tech Mart portal[16] provides information about new technologies, high-technology products and market news, science and technology events, and links technology transfer web portals of science parks in countries such as India, China, the Republic of Korea, Malaysia.

Quality
Although virtually all technopoles claim to provide high-quality services, the most successful have adopted quality as their positioning focus. Historically, recipients of science park services have found it difficult to discern quality other than through anecdotal evidence. This is changing rapidly.

Access
A strategy that emphasizes accessibility focuses on attributes such as location[17] and hours of operation. Ease of access to the park's location can be an essential part of its positioning strategy. Indeed, many new and replacement infrastructures are constructed on or near major highways. The number of facilities the park operates can also be an effective positioning strategy. Finally, the availability of services after usual business hours and on weekends is another example of an access position.

Scope
The range of services offered provides another positioning opportunity. The current trend seems to focus on a specialty such as ICT, agro-food, or neurosciences. At the same time, the breadth of services supplied in the same place (one-stop shop) is instrumental in differentiating science parks. Vertically integrated parks also provide IPR assistance, technical facilities, partnership building, access to university support, financial counseling, and strategic advice.

Innovation
Leading-edge science parks can strengthen their competitive position by improving their innovation performance. Often, being a leader in the local context creates a strategic position that is difficult to match or surpass. Academic centers and specialty institutes with substantial relevant resources, major research funding, and renowned scientists play a major role in sustaining the dynamism of these parks (see Box 2.12).

16 See http://technology4sme.net **17** Location factors are key elements in the successful promotion of technopoles, as evidenced by many feasibility studies. For example the Gyeongsan Region (Korea) review confirms the major role played by the following factors in enhancing the image and the visibility of the local technopole: an abundant workforce, well-equipped research facilities, ease of access, a concentration of allied industries, advantages from a neighboring large city, and a pleasant environment.

4. Project development and opportunities

Box 2.12

Tapping local knowledge

The National Institute of Science, Technology and Development Studies (NISTADS) of India has set up a science and technology field station at Bankura in western Bengal to upgrade technologies for artisans and craftsmen by blending the traditional with new technologies. Specific software packages are being developed in collaboration with local providers of information technology solutions to facilitate digitization of pictures and designs produced by artists / designers. As a result a large number of craftsmen have adopted this new technology mix to increase efficiency, quality, flexibility, and cost-effectiveness

Industry segments

Focusing on a specific industry segment may help to achieve a stronger market position. Most frequently, science parks emphasize SME-based strategies in niche sectors. Serving a targeted population of firms allows the park to deliver highly customized services. In some regions, sensitivity to the needs of local communities and taking advantage of local traditional competences can be a powerful positioning strategy.

Economic policies

Many countries have a set of policy measures to attract foreign direct investment (FDI). Tax incentives, grants and duty-free zones are commonly used instruments. Science parks in the MEDA countries often piggy-back on these policies to take advantage of the technological potential of FDI.

Multinationals can play a leading role because of their innovation potential and their capacity to disseminate new technologies to local subcontractors.

Involvement of foreign investors

Multinational enterprises (MNEs) spend significantly on R&D in technopoles, but their investments are predominantly for development of applications. They tend to locate near internationally competitive basic science, thereby leveraging effectively national R&D investment and benefiting from specific local advantages.

Focused public investments which create critical mass of sufficient scale can attract MNE investment to excellent research infrastructures and technological and services platforms. At the Tunisian telecommunications technological park El Ghazala (the second largest in Africa), several foreign high-technology companies and major foreign groups (call centers, Internet research centers) have expanded their presence in the area of new information technologies.

4.3 Science park positioning and networks

Networking between parks and between parks and institutions and various levels of government can help increase performance and the park's innovation potential.

The concept of networking is fundamental. Competitive science parks need to create an organizational context in which networking among tenants, universities and companies outside the park is encouraged and reinforced. The competitive advantage of science parks relies on the development of business and technological alliances, partnerships and opportunities with similar technopole organizations, research centers and firms located around the world.

The competitive positioning of parks is usually carried out through an analysis of the international market structure (supply and demand, perspectives) and the science park's skills and infrastructures. However, parks also have to position themselves with respect to existing national and international park networks. It is necessary to bear in mind that:

• The science park network is based on relationships with the central government, local governments, universities, large and medium-sized firms, venture firms, and associated institutes (endogenous networking). **Cooperative networking between the local government and the park management** helps to enhance the park's performance;

• Such international collaboration is a strong axis of the park's positioning strategy. This can strengthen the technological innovation capacities of the local area as technopoles often seek skills and resources beyond national borders. Such International collaboration (exogenous networking) can take place through **bilateral collaboration with one or more parks with the same sectoral focus** (international clusters), through **participation in other parks' scientific or collaborative research projects, or through multilateral industrial development initiatives** (subcontracting and integration in industrial value chains) (see Box 2.13).

Box 2.13

Science parks and networking: some examples

Science park networking is becoming more and more important owing to the extensive promotion of huge investment programs to launch national technopoles, but there has so far been only limited effort to create synergies among them.
A MENA workshop in 2007 therefore focused on practical issues of network building and content. Participants from seven countries of the region agreed on establishing "MENAinc", the network of business incubators in the Middle East and North Africa. Business incubators in Bahrain, Jordan, Libya, Morocco, Palestine, Syria, and Tunisia decided to cooperate to strengthen entrepreneurship and develop SMEs in the region.

Networking is a major component of the incubation program in the Al Akhawayn University Incubator in Morocco. Tenants can be connected with regional and international partners. Thus, the incubator promotes networking within the incubator (thematic meetings, ICT tools), at national level (thanks to the university's relations with key economic actors and the use of various marketing and communication tools), and at the international level. The Morocco Center of Entrepreneurial Excellence (MCEE) will be based at the university and funded and co-managed by Beyster Institute in the United States. Agreements with other science parks have already been signed with the Montana State University Techpark and the incubator of l'Ecole de Mines in Alès, France, involving multinational companies interested in the project and international NGOs.

Examples in Asia include Malaysia's National Incubator Network which would link a central incubator to eight centers, including Technology Park Malaysia (TPM), UPM-MTDC Incubator, and Kulim Hi-tech Park, which are already in operation. The establishment of this incubator network was considered crucial to help generate the much-needed pool of SMEs necessary to meet the demands of the MSC cluster project when it rolls out nationwide.

It is widely recognized that a science park's effectiveness can be enhanced by networking. Many parks have multiplied agreements with their counterparts in other countries. For example the El Ghazala Technopole has signed partnership agreements with the Technopole of Bari (Italy), the Technopole of Nice Sofia-Antipolis (France), and Marseille Innovation Technopole (France).
Such agreements have often been made in the framework of bilateral cooperation. The increasing exchange and networking between Chinese and Korean technopoles (e.g. Beijing-Hanggju City and Gyeongsan City) to promote technology transfer, trade enhancement, and technology forums and conventions reflects this new trend. The objective of these agreements is generally to stimulate foreign investment in the network through enhanced development opportunities and service supply.

5 Practical tools and instruments to support and implement the positioning process

5.1 Positioning the science park

To ensure good positioning of the technopole, it is necessary to identify the needs, to set up a mandate and to define objectives. The most useful techniques for doing so are the following:

Needs assessment
This is a tool for program planning. It consists in a systematic qualitative and quantitative exploration of the ways things are and the ways they should be. It is based on: focus groups with a small group of people with discussions carefully planned and led by an experienced moderator; in-depth or key informant interviews with a small number of individuals carefully selected for their personal experience and knowledge; community forums or public meetings which are larger and less formal than a focus group; and surveys involving systematic data collection from a sample of individuals to generate statistics.

Gap analysis
This is a simple and useful tool to help managers and organizations, especially in the field of marketing, to decide upon strategies and tactics and to analyze processes. It consists in measuring the gap between the current situation of the company or organization and its desired situation. At its core are two questions: "Where are we?" and "Where do we want to be?" The situation can be expressed in terms of market share, financial objectives, etc. Gap analysis seeks to identify and correct gaps between desired and actual levels of performance. In fact, gaps are indicators of needed corrective actions and improvements. For a technopole, gap analysis can therefore be very helpful for setting up an overall strategy to reach the pole's objectives.

Technology foresight
This is a systematic effort to visualize science, technology, industry, the economy, and society in the long run, in order to identify technologies that can generate economic and social benefits. Its main function is to determine a future demand-related technological profile and to look at present S&T technologies in the light of hypothetical projections of future economic and social developments[18].

A frequent objective is to identify technologies expected to have a strong influence on future development and well-being and thus to prepare for the future and to carry out as early as possible the actions needed to adjust to this future. Technology foresight defines the most efficient relationships between technological possibilities and the current economic and social needs of the community. One of its main benefits is to federate views on the future of the relevant stakeholders (industry, academia, the public sector). Most technology foresight methodologies are qualitative and based on Delphi methods, expert panels, scenario buildings and the identification of critical technologies.

Roadmap
These lead to effective project portfolio development and management. They provide the framework for organization-wide technological strategic development and technology assessment, as well as project evaluation and strategic aligning at the division level. Roadmapping tools provide a common language for innovation and help build bridges between the organization's key players. This is a time-based strategic planning process which contributes to align and communicate the business's needs ("know why"), with delivery programs ("know what") and the underpinning resources ("know how"). A roadmap sets the strategic plan for the identification, evaluation, and maturation of alternative technological solutions. Roadmaps differ from project plans in at least two essential ways: they are generally concerned with longer timeframes than project plans; and they deal with more strategic levels of information, and as such are often concerned with navigating areas of high uncertainty. Common software such as Excel, PowerPoint or Visio is generally sufficient to produce roadmaps.

18 In China, the Ministry of Science and Technology (MOST) is pursuing a strategy to build a "Chuangxin" (innovation, recreating old technology) framework for national science and technology and to enhance the creativity of the national science and technology system.

5.2 Consensus-building technique

The example of the EASW (European Awerness Scenario Workshops) initiative
The EASW Initiative was launched in 1994 by the European Commission to explore possible actions and social experiments to promote a social environment favorable to innovation in Europe. The EASW methodology was "invented" by the Danish Board of Technology and subsequently "Europeanised" and tested by the Dutch TNO in order to understand and exploit improvements that can be achieved in ecology and in the dissemination of innovation using participatory decision-making processes.

The methodology has been developed as an instrument for participatory planning, based on dialogue and collaboration between groups of local actors to create sustainable cities and to create a balanced relationship between society, technology, and the environment. In an EASW, the participants represent the four main social categories of a community (citizens, technology experts, administrators, and representatives of the business sector) and act as local or regional experts who can help to develop new rules for the management of planning processes.
In its original design, the EASW:
• allows the exchange of knowledge, opinions, and ideas among technology experts, citizens, and representatives of the private sector and public administrators;
• identifies and discusses the similarities and differences in the perception of problems and their possible solutions among the different social categories involved; and
• stimulates political debate in local communities on the role of technology in sustainable development.

5.3 Support tools and evaluation methods

Every science park stakeholder has to contribute to the overall effort to attract new projects and opportunities. In support of this function the park can use the following tools:

Technology Matching DB
This is an electronic tool for sharing and accessing knowledge. It consists of repositories hosted by interested stakeholders with a common electronic infrastructure for accessing and distributing technological information and resources. This interactive knowledge-based information management system allows for dynamic content generation and decentralized management. It helps technology repositories to manage and systematize their own proven technologies. It facilitates dissemination, adaptation, and adoption across broadly similar environments and systems. It also contributes to technology transfer and linkages between technology communities.

Knowledge market (KM)
A KM is a place where knowledge is traded. It brings together buyers and sellers who do not necessarily know each other. It allows participants to compare what is on offer and learn more about the products and services that are available. It engenders competition and generates innovation. It also fosters cooperation by helping suppliers get together to address common concerns. In the real world, trade exhibitions and competitive tendering for services are situations that exhibit some of these characteristics. Conferences are other occasions at which professionals can increase their knowledge, for a fee. As well as markets for goods and services, KMs have buyers, sellers and brokers and market pricing and exchange mechanisms, although money is rarely the form of payment. The pervasiveness of the Internet has started to shift existing knowledge markets to the web.

Practical tools and instruments to support and implement the positioning process

Investment appraisal methods

One of the most important steps in the capital budgeting cycle is working out whether the benefits outweigh the costs of investing large sums. The methods that business organizations use can be categorized in two ways: traditional methods and discounted cash flow techniques.

Traditional methods

• Payback: is often used as an initial screening method, this is literally the amount of time required for the cash inflows from a capital investment project to equal the cash outflows;
• Average rate of return: expresses the profits arising from a project as a percentage of the initial capital cost [ARR = (Average annual revenue / Initial capital costs)x100].

Discounted cash flow techniques

• Net present value (NPV): relies on the concept of opportunity cost to place a value on cash inflows arising from capital investment. NPV is a technique by which cash inflows expected in future years are discounted back to their present value. This is calculated by using a discount rate equivalent to the interest that would have been received on the sums had the inflows been saved, or the interest that has to be paid by the firm on funds borrowed;
• Internal rate of return (IRR): is the annual percentage return achieved by a project at which the sum of the discounted cash inflows over the life of the project is equal to the sum of the capital invested. Another way of looking at the IRR is the rate of interest that reduces the NPV to zero.

Partnership-building tools

Partnership-building tools offer helpful, succinct guidance on identifying potential alliance partners to facilitate a dynamic and helpful kick-off meeting and to create an appropriate memorandum of understanding. These tools also help to achieve the partnerships goals.

By attributing a score to many criteria, partnership-building tools help to:
• assess the readiness of the potential partners;
• identify promising partners by scoring their motivation, expertise, willingness to collaborate, culture, background, etc.;
• prepare a start-up meeting once the partners are chosen (preparation, agenda, objectives, etc.);
• define the alliance strategy and communication;
• and diagnose alliance challenges and find remedies.

Generally, such tools are presented as a set of multiple choice questions, matrixes, tables and scoreboard.

CHAPTER 3

DEVELOPMENT OF A SCIENCE PARK OR TECHNOPOLE AND URBAN INTEGRATION

Highlights

The choice of a location for a technopole or a science park is a crucial task. It must take account of strategic objectives along with land availability and technical and functional facilities. The site should be chosen according to the following criteria:

Land availability. The creation of a science park should be governed by an economic development plan which defines areas of activity in terms of business sectors or economic functions. The planning process should consider extensions likely to be needed during subsequent development phases.

The proximity of transportation or access infrastructures. In the knowledge economy, rapid transportation facilities are as important as intangible networks.

The presence of university facilities and / or research laboratories is an asset frequently referred to by science park sponsors. The design of these facilities should facilitate cooperation with companies, although this is not often the case. Ideally, the spatial and functional links between different components of the park should be defined at the start of the project. Technology parks in British universities are often presented as good examples of integration between education, research, and business.

The return of urban centers. In many European metropolises, the shortage of space has led science park sponsors to invest in land in peri-urban areas. Experience shows, however, that company founders and their partners and customers often prefer to be able to meet to discuss their projects in bars and restaurants in city centers. This facilitates social interaction, dialogue, etc., which are essential elements, in addition to the business purpose, of all joint projects.

The success of a science park will greatly depend on its appropriation by the inhabitants and companies in the metropolis. The following are the major challenges for developing urban science parks:

Define a layout and facilities that are commensurate with the science park's strategy, with a view to international competition between regions. Decision makers should anticipate the future attractiveness of the national and regional economies into which it is incorporated and remember that it takes at least ten years to develop a science park.

Define the facilities according to the needs of local companies and of foreign companies that the park wishes to attract. The success of a science park on a local level is essential to its international appeal.

Set the size of the infrastructures, facilities and services to fit a science park concept from the outset: a science park is not a collection of business parks.

Create the conditions for the project's success from the outset. The scale of the first public investments, the type of facilities initially established, and the quality of the skills mobilized are all instrumental in making a science park attractive. Initial public investments are decisive and should be substantial. The primary role of public-sector intervention is to create a solvent property market. Tax incentives and investment subsidies are also a real asset. However, as the balance sheet of a science park is often negative, the return on public investment should be seen in terms of the number of jobs created, the tax revenues generated, etc.

Offer business locations within the technopole, and service and expertise packages from the host metropolis: (e.g. training and legal and financial expertise) Incorporating the science park into existing and future clusters is decisive. A science park is a location for a range of facilities and services that give specific added value to the development of regional cooperation networks between companies, universities, and research centers.

Effectively manage the various developers within the framework of the technopole's operational governance structure: those responsible for university facilities, research facilities, commercial property, shared facilities, etc. Effective coordination of the developers is essential to the cohesiveness of the project.

Make public / private cooperation schemes key factors in the success of the technopole. The participation of public institutions interested in direct or indirect spin-offs of the project is certainly necessary. It is, however, essential to let private investors and operators take their full place in implementing and running parts of the program.

Take into account the following key factors of success:

- Ability to mobilize all the project partners from the start.
- Importance of the quality of the project start-up phase to the end result.
- Control of all aspects of the project (networks, sites, facilities).
- Public investment essential at the start;
- Appropriate infrastructure levels.
- Quality of the public-private partnership.
- Activity areas that stimulate creativity and business.
- Ability to develop the project phase by phase and to be flexible, according to market trends and company needs.
- Size and qualifications of the coordination team.
- Original approach to real estate, aggressive marketing and promotion.

Science parks are a long-term investment requiring careful preparation.

Science parks are one aspect of the economic development of a region and of the competitiveness of metropolises in the knowledge and innovation economy. Successfully creating a science park means meeting two different but complementary challenges: first, creating one or more areas[1] with infrastructure, facilities, and services that facilitate communication between companies, research centers, and higher education institutions; and second, linking these areas to functions of the host metropolis in order to create development centers.

It takes time to build a science park: it is a medium- and long-term project. A long study phase must be completed before making the substantial start-up investments required.

To launch and foster the development of the park, it is necessary to define a strategy, proceed with the investment in land and facilities, and coordinate the different functions of the park.

There are four main phases in the development of a science park:

• The definition of a strategy on the basis of international, national, and local factors, of the choice of the scientific, technological, and business activities, of the appropriate inducements, and of the development objectives. At the local level, the links between the science park and the various functions of the host metropolis must be carefully studied.

• Once the strategy has been drawn up, it is important to define a science park concept, i.e. to specify how, and according to what functions, the infrastructures, the facilities, the layout, the services, the governance method, etc., will contribute to implementing the strategy;

• These functions must then be transformed into products: installations and facilities (resource centers, technology transfer centers, incubators), real estate products (rentals, purchases, business centers), infrastructures, personal and corporate services, urban integration factors (information and communication technology (ICT), networks, access roads, etc.), which will bring the science park to life. At this point, a programming chart is drawn up, covering the different areas, real estate, and facilities;

• Finally, a strategy for coordinating the science park and marketing its different areas, facilities, and services must be drawn up. This is integrated into the project's management, development, and supervision procedures and its organizational structure, along with the skills, human resources, and financial resources needed to implement the project. This strategy becomes the strategic and operational governance of the project.

1 A science park may consist of a main area or technopole, or several sites with individual identities and vocations: in the latter case, they are called multi-polar science parks. Marseille is an example of a multi-polar science park: Château-Gombert, Luminy, etc.

1 The science park development context

1.1 Choosing the location

Identifying an appropriate location is a first prerequisite. This means acquiring land, establishing a long-term plan for purchasing land in the future and developing capacities to ensure transportation and access to the site.

Choosing a park's location is very important: it must both meet strategic objectives and take account of the availability of land and technical and functional facilities. To provide the metropolis with a hub of creativity and technological and economic development, excellent transportation services and access roads are essential; however, the location must also stand out in terms of its quality and symbolism in order to create a highly visible, efficient operation that is fully integrated into the functions of the metropolis. Technological proximity is important, and a location close to higher education or research institutions is an advantage.

The site should be chosen on the basis of the following criteria:

Land availability. A key factor is the alignment of land availability constraints in the metropolitan area with reasonable, ten-year development objectives. Ideally, the creation of a science park or a technopole should be governed by an economic development plan which defines areas of activity and their use in terms of business sectors or economic functions. Because the marketing of a science park operation is a slow process, only one or two hectares may at first be sold each year; and there is therefore little point in planning a site of several hundred hectares from the outset. On the other hand, defining facilities for start-up companies on small plots of land on a university campus, without taking into consideration extensions that will be needed during subsequent development phases, will prevent the creation of the necessary pool of skills and hinder the desired expansion. If planning ahead was quite easy to do in Europe 30 years ago[2], the densification of metropolitan areas makes this more difficult today. This means that sponsors must defend their sites until they are full – i.e. for at least 10 years – while the need for urban space also becomes more apparent, to build schools, hospitals, hotels, etc.: space is becoming a rare commodity.

The proximity of transportation or access infrastructures. In the knowledge economy, speed and transportation facilities are as important as intangible networks. Small technological companies and large corporations alike require efficient transportation to link them to their customers, suppliers, service providers, and scientific partners. It can be as hard to get from A to B within a metropolis – where car journeys, for example, take more and more time[3] – as to travel from one region to another. Governments and local authorities sometimes have to intervene in this area to reinforce the competitiveness of science parks[4].

This also requires ensuring efficient spatial configuration of university facilities and research labs within the park as well as good connections with the urban neighborhood.

The presence of university facilities, research laboratories, etc., is another asset frequently referred to by science parks sponsors. Nevertheless, simple proximity does not imply that the different populations will mix and that connections will be established among all potential actors in the innovation process: researchers, academic staff, students, entrepreneurs, financiers, etc. If cross-fertilization is to take place, the existing education or research facilities need to facilitate cooperation with companies; this is not often the case. Indeed, it is seldom possible to integrate enterprise zones into public university campuses and thus facilitate circulation between them. Ideally, the spatial and functional links between the different components of the technopole should be defined at the start of the project, as in the case of the Reunion Technology Park (France). Technology parks at British universities, such as Cambridge Science Park or Herriot Watt in Scotland, are often cited as good examples of integration of education, research, and business (these universities own the land on which the technology parks are built, and the primary purpose of the parks is to host spin-offs from the universitys' research laboratories). Nonetheless, the cultural and behavioral obstacles to connections between companies and research laboratories are the same as elsewhere.

2 For example, the main site of the Rennes Atalante technopole in France benefited from long-term spatial planning. The Coesme Beaulieu site was established in the early 1980s, on land that had been reserved 20 years beforehand. **3** In France for example, the Château-Gombert site in Marseille is still suffering from its relative isolation from the metropolis and the fact that it is not served by the public transportation system despite its density, which is the result of a long and patient development process. **4** The Saclay plateau to the south of Paris – where there is a high concentration of scientific and technological activity – is another site that does not benefit from flexible connections to the public transportation system and this hinders its development. It has become a top development priority for the French government, and will soon benefit from a transportation infrastructure plan commensurate with its development potential.

1. The science park development context

The return of urban centers. In many European metropolises, the shortage of space has led science park sponsors to invest in land in peri-urban areas. Experience shows, however, that company founders, their partners, and their customers like to meet and discuss their projects in the bars and restaurants of the city center. This clearly illustrates the need not only for an area for business purposes but also for space for the social interaction, dialogue, etc., which are essential to all joint projects. The distinction between the science park itself and the friendly, relaxing places in which people meet to discuss projects and business shows how important city center services can be to the development of a technopole: in fact, these services reflect the value of the metropolis and its functions.

1.2 Land-related issues

The ownership of the land in a park may be private but the low rate of return favors public or semi-public involvement.

Land policies concern the ownership and size of building plots as well as the issue of public spaces. It is important, first of all, to control the ownership of the land on which the science park is to be developed: the ownership may be full or gradual[5]. If some of the land is publicly owned, or managed by a semi-public company on behalf of a public-sector developer, the resulting diversity and the lack of commercial profitability[6] make it more difficult for a private organization to manage the entire science park. However, in the United States, a number of fully private technology parks operate. Stanford University (California), a private university, still owns the land on which the Stanford Research Park is built[7]; companies sign very long-term leases with the university.

Box 3.1

Spatial planning principles in science parks

The firm or firms in charge of the layout of a science park, or the semi-public companies operating on behalf of the technopole, must take into account its individual dynamics and objectives. It is necessary to:
• Distinguish between areas for work and areas for relaxation, those dedicated to the creation of projects or companies and related activities and those that facilitate meetings between people. These will either be public spaces or managed by private companies acting as agents for a public authority;
• Mark off areas dedicated to small technological companies in the start-up phase, with a view to installing specific facilities: incubators, commercial property, business development centers, etc.;
• Identify privately owned areas for rental premises or for companies wishing to purchase their own offices after a period of rental for example;
• Set aside larger areas for mature, external companies wishing to set up offices within the technopole;
• Size the site entrances appropriately so that they are clearly visible within the urban area and provide a functional connection with the metropolis.

The criteria and the choices made are part of the technopole project strategy. The technopole's spatial characteristics will be determined by its vocation. For example, the so-called "multipolar" parks, i.e. those with several sites, offer a variety of spaces dedicated to specific sectors or company development phases (start-up, development, R&D, small production runs). In France, the major cities – Paris, Lyon, Lille, Toulouse, Bordeaux – have this kind of technopole.

5 The technopole can, in fact, be created on a central area of land, with more land reserved for future extensions to be purchased progressively. **6** At least in the short and medium term. After 30 years, tax revenues generated by a site like Sophia Antipolis are substantial, around EUR40 million a year. Nonetheless, it will take many years to amortize the EUR600 million in public funds invested in the project since its inception. **7** http://www.stanford.edu/home/welcome/research/researchpark.html

In Europe, once the land ownership issue has been settled, science park sponsors must plan their use of the land and define the terms of ownership associated with each parcel. Some plots may be sold to private sponsors or directly to companies. However, this must be done in compliance with an overall plan to protect internal access rights, public spaces (squares, car parks) and the development of public facilities (universities, research laboratories, corporate resource centers, incubators, etc.) and personal services (restaurants, sports centers, etc.).

Furthermore, experience shows that it is difficult to have companies from very different sectors of activity on the same site; for example, the agro-food industry alongside telecommunications, or small-scale mechanical companies (wich can be noisy and sometimes polluting) next to biotechnology. In addition, although, technically speaking, a business park can host any type of company, some combinations may be detrimental to the image of certain companies. Besides, sharing facilities and services means that the activities must be similar in cultural or technological terms.

However, this does not mean that science parks should be over-selective. Innovation is generated by the interface between different areas of activity, and certain industrial companies (including small industrial technology companies) can clearly benefit from the proximity of service providers (lawyers, accountants, etc.).

Building a successful science park in which the various sections operate together smoothly despite their diversity and different project dynamics is quite a difficult task, especially when one considers that the spatial layout will only become strategically and technically relevant over a period of around ten years, while the economic context changes constantly.

1.3 Preparing the building site(s)

Another prerequisite is to select carefully the equipment and basic infrastructures (electricity, broadband, roads, green spaces) needed for the day-to-day life of the park. ◀

Preparing a technopole site involves defining shared infrastructures and deciding how they will be developed and funded. The preparation of a site affects the cost of the land and the property to be built on it. The provision of basic services such as drainage or electricity and access roads is a given, but there are other, more challenging, issues: are broadband infrastructures required? Should there be shared renewable energy solutions (photovoltaic solar systems, wind machines)? Are high-quality green spaces an advantage for incorporating the park's different activities and their specific architectures into the landscape plan?

The answers can increase the "land charges" of these operations. In any case, technopoles are generally expensive because of:
• their "loss leader" dimension;
• the quality of the installations, infrastructures and architectural elements;
• requirements relating to the diversity of their activities;
• the varied and sometimes innovative infrastructures.

Hence, a good deal of thought must be put into the basic infrastructures and how they will be developed, managed, and financed. Some can be developed and run by private companies, provided that there is a market. However, facilities such as incubators and technology transfer centers must meet their running costs as best they can, and the occupants alone can rarely offer a private operator a solvent market. Therefore, a public entity often needs to intervene until the facility has reached a critical size and a market emerges so that it can be taken over by a private company. This approach is used in many areas of a science park project, and public funding is often needed to facilitate the participation of private operators in subsequent development phases.

2 The programming chart and the implementation of inputs: facilities, land, and services

2.1 Programming

The relevant programming chart needs to address not only infrastructure and equipment issues but also environmental and landscaping problems in order to improve quality of life in the park and to facilitate the integration of activities.

A science park's programming chart must address the following questions: What basic components are needed to start up the site? Where should the various activities be located in order to create a site that "works"? Where will the areas and facilities that foster communication between companies, researchers, and academic staff be positioned? What types of facilities are needed to promote conviviality and cooperation between companies and research organizations? What will be the focal areas of the site?

In any case, the choice of facilities for connecting companies and research laboratories, facilitating the creation or hosting of innovative companies, and delivering services and technical support to existing companies (services and facilities that they cannot provide themselves) is crucial to the success of the site.

The programming of a technopole calls not only for planners and economists but also for specialists with experience in the field who know how to manage multidisciplinary teams. The program lays the groundwork for the project, and the investments of companies, research centers and public authorities will gradually give the science park its concrete existence. However, despite the best intentions of the sponsors, the initial program does not always create the social dynamics needed to develop effective innovation and technology transfer processes[8].

To this end, science parks need to implement a (hidden) agenda based on the availability of core equipment, the definition of goals, the organization of partnerships and the management of spatial systems.

Although each situation is different, technopole development projects are all based on a handful of common processes[9]:

Create a project core (located in a central public space) consisting of:
- premises for an incubator;
- a catering establishment;
- shared services for companies (meeting rooms, documentation center, site management, etc.);
- a university component, consisting of a research laboratory[10], teaching units that are open to cooperation with the business sector, and a department that acts an interface between the university and business.

Select the academic and research "components" wisely. When setting up these institutions in the science park and defining the program, it is important to consider the specific features of the site and the expected dynamics. Halls of residence for students and researchers must be provided close to the university buildings on the site.

Define the site's development goals. The site's commercial success will depend on these goals. It may, for example, start from a central core and develop outwards on the basis of technical development conditions and access roads. In this respect, the supply of commercial property for rent or purchase, and the marketing of building plots or specific products such as business centers, must be discussed between the developers and the association in charge of coordinating and promoting the site in order to define a phase-based approach.

8 For instance, if the Sophia Antipolis program were to be defined now, with the advantage of 30 years of experience, it would not be the same; in particular, more emphasis would probably be placed on focal areas, capable of binding corporate and research activities both socially and economically. **9** These examples are taken from the development program for the Reunion technology park, designed by Thierry Bruhat Consultants and Jacques Masboungi from the Sophia Antipolis SPC. **10** The activities of which are of potential economic value.

Open the site to the outside world and incorporate it into the site's environment. The park or technopole must not, because of its specific functions, become cut off from its urban environment. The creation of a nature park or sports and leisure facilities can open the site up to the surrounding neighborhood and facilitate its urban and social integration. Furthermore, buildings that look out over surrounding roads and the main access roads, along with a precise and clear delimitation of specific areas, should give the site a strong identity and facilitate its integration into its environment. The affirmation of its urban functions and specific features should be reflected in the urban landscape and architecture which should promote indirectly the value of the natural areas within the park and the city roads around it.

Set up an architecture and planning monitoring unit to work closely with the project managers. This will guarantee continuity in decisions and coherent action. This unit should be supported and backed by the various organisms responsible for drawing up quality reports. Members of the unit should be kept abreast of issues relating to the marketing, operation, and management of the site.

Organize a partnership between investors and private partners, on the one hand, and the organisms responsible for developing the site, on the other, in order to make the most of all resources and mobilize all available energy. In such a partnership:
• public-sector partners are generally responsible for developing shared facilities such as a resource center or incubator;
• the availability of real estate will be governed by market forces, even if it is coordinated by public-sector partners;
• some services, such as the catering establishment, sports and fitness centers, etc., may be funded by public-sector partners and managed by specialized companies.

2.2 Defining and developing science park facilities

The attractiveness of a science park will be enhanced if it hosts well-designed resource centers which provide documentation, economic and technological information and means of dissemination end with….

The park's strategy and concept will determine the definition and development of its public entities (universities, research centers), parapublic facilities (resource, conference centers and technology transfer centers, incubators) and private facilities (catering establishments). In most cases, to achieve good communication dynamics in a science park, the layout and facilities must be designed in such a way that the functional and spatial structures are compatible. As indicated above, the science park program may therefore provide for a central "core" of facilities and services, comprising for example a resource and reception center, an incubator for innovative companies, and a catering establishment.

These three types of facility will be decisive not only for the quality of the host site and its services, but also for its ability to unite all those concerned by the main objectives of the technopole project and encourage them to work together to attract activities, start momentum toward the development of skills hubs, and support the creation of innovative companies.

2. The programming chart and the implementation of inputs: facilities, land, and services

The research and reception center

A resource center must not only provide the information, expert evaluations, etc., expected by the park's occupants, it should also act as a bridge between organizations that already offer all or some of these services in the metropolis or region[11], for example, by creating a network. This type of facility may include:

• **A meeting, conference, and seminar area**, with an auditorium (150 to 200 seats) and several meeting rooms (20 to 50 seats) for conferences, training sessions, and meetings (rental);

• **A documentation center,** designed as an extension to the university's documentation center and comprising a reading room, a documentation service, a videoconferencing room, a multimedia center, etc. The documentation center may also pool the resources of several professional or technical organizations in the technopole or its environment: chamber of commerce, federation of industry, technical centers, incubators, etc;

• **A network leadership unit,** representing existing company support organizations and services in the area around the technopole. As these organizations do not always have the budget to extend their activities to the science park, this unit must make the necessary funds available from its own program or facilities. The goal is not to create a new layer of services, but to facilitate networking between existing organizations in order to provide project owners and innovative companies with the clearest and most efficient range of services possible;

• **Offices for the science park coordination team,** composed initially of two or three people. This team's efficiency depends on its ability to mobilize skills wherever they are, according to its coordination objectives;

• **An exhibition area,** presenting scientific and technological achievements, as well as the companies created, may also be set up.

… as well as at least one incubator offering office space and various training and economic services to start-ups and catering facilities for the park's employees.

The incubator

A science park must provide office space for young companies and for project owners in the pre-implementation phase. This space is rented out to companies as part of a package, which also includes shared services and facilities (photocopiers, secretariat, etc.) and specific services: training, marketing, financial appraisals, etc. As the latter are expensive, it is best to use organizations in the metropolis or region, as well as existing corporate networks and clubs. It is reasonable to define an initial phase during which at least $500m^2$ are made available for incubation services. A few temporary offices may be added for project owners in the business plan development phase (incubation). The incubator may be incorporated into the science park's resource center or central building, or it may be in a separate physical location (within a group of facilities). It may also be included in office buildings; therefore, if take-up is slower than expected, vacant space can be allocated to other companies[12].

Restaurants and relaxation facilities

Several needs must be met: daily catering services for those who work on the site: students, companies, researchers, and occasional business dining. Specific catering facilities must be defined for each of these needs. It is often difficult to attract private restaurants during the start-up phases, owing to the significant commercial risk and the lack of a critical customer base. On the other hand, if the site is located in an urban area, and if the people who work there need a place to eat, they may become potential customers for the services provided by the technopole; the same holds for hotels. In the first years of the technopole, there are not enough occupants to ensure the profitability of such facilities. With regard to catering, privately run services can be provided through publicly funded facilities. This reduces the risk for private operators. Drawing customers in from the surrounding area can also help to promote the site.

In addition, the host metropolis can provide entertainment, restaurants and hotels for people attending events such as scientific or technical symposiums or conferences; these services should therefore be promoted.

11 Examples of resource centers can be found in the Angers and ESTER Limoges science parks in France. **12** This is possible in the tertiary sector, but more difficult in the agri-foodstuffs and biotechnology industries, as the highly specific nature of their facilities (laboratory benches) prevents the re-allocation of space.

2.3 The commercial property policy

The commercial property policy aims at identifying the needs of firms in the park and adjusting the supply of offices and building infrastructures.

The commercial property policy is a key factor in the development of a science park. Commercial property is often developed on the basis of the number and type of companies on the site, as these can ensure the promotion of the site. The strategy and concept of the park determines the types of commercial property to be developed: unfurnished offices, rental property, business centers, incubators, workshops, or test laboratories. The policy should also define whether property is for rent or for sale.

First, a market survey must be conducted to identify the park's needs. These needs must then be broken down into segments. Most often, science parks start out with a business plan based on the relocation of local companies[13]. These firms are attracted by the site's originality and quality and by the fact that it will provide a showcase for their activities. These image-enhancing effects should not be underestimated: they help science park projects to get off the ground. Indeed, when companies are asked, after 10 to 15 years, why they are happy in the park, they often refer to the exclusive address and the image that goes with it. Networking opportunities and a friendly atmosphere are much lower on their list of reasons for satisfaction[14].

The market survey should also take into account the needs of companies outside the metropolis, the region, or even the country. Nevertheless, the ability to attract foreign companies should not be overestimated[15]. Multinational companies often do not think particularly highly of science parks, which are expensive and restrictive in terms of spatial organization. They prefer to have more land at lower cost and to build their own facilities. On the other hand, international SMEs operating in the technology sector or innovative service companies can be attracted to science park sites for their services, facilities and pleasant atmosphere. The market survey must also address entrepreneurial dynamics in the region or metropolis and identify unsatisfied needs, notably among company founders and innovative companies. It must nonetheless be borne in mind that the rate of company creation is not very high.

Once the market has been broken down into segments and the needs of each segment have been analyzed, the next step is to define the products that meet these needs and decide on the business model for developing them. For start-ups and young companies, property development which includes services and which is managed by a public or parapublic operator is often thought to be the most appropriate solution. Private investors or sponsors are extremely reticent to invest, given the risk of insolvency associated with this type of customer and the instability of their needs, for example in terms of office space. On the other hand, if the clientele is more financially sound and has less volatile needs, private sponsors may be interested from the outset, provided that the site fulfils a need clearly identified by the market survey.

During periods of strong economic growth, investors may be interested in unfurnished office projects. In Europe at least, investment practices have changed: private investors will only commit if the volume of already commercialized office space is sufficient. In addition, they tend to share the risk with a public or parapublic organization, while maintaining the option to take full control once the product has been fully commercialized.

There is an ongoing debate about how extensive and dense property development should be in order to provide a good profit margin along with exceptional quality of life and good leisure areas. Science parks created in Europe in the 1980s and 1990s have a relatively low floor area ratio: for example, 0.2 in a landscaped area, resulting in well-integrated 3 to 4 storey buildings. However, in Singapore and Dubai, technological tertiary sites now have much higher density. Density can also promote integration of activities, provided that these activities lend themselves to such integration and that integration is facilitated by other services.

13 That is, companies in the economic basin of the host metropolis. **14** This was clearly shown by a study conducted in the late 1990s by the association companies representing science parks in France. **15** With the exception of technopoles of national interest, set up as pilot sites for foreign companies; these operations benefit from the advertising resources of government organizations.

2. The programming chart and the implementation of inputs: facilities, land, and services

2.4 Services offered

The supply of services in the park includes those linked with advertising and marketing the park as well as mediation and cluster services. These services along, with expertise services and good accommodation infrastructures, are major comparative advantages for parks and for firms looking for a site in which to invest.

The science park's services are multi-faceted and can be broken down as follows:

Advertising and marketing of the park, its facilities and services
The development of a science park requires substantial resources for advertising and marketing. Decisions to relocate or create an activity are generally considered very carefully. They require convincing arguments from people with the appropriate skills and experience. The science park concept and its objectives are relatively new and it therefore takes time to explain to investors what they stand to gain from investing in an operation that, while risky, will be financially profitable and image-enhancing in the long term. This requires dedicated marketing teams which cooperate closely with teams from private or public developers working on certain parts of the project: sale of developed land, commercial property, etc. All of these teams must keep in mind the services and facilities that companies on the site will require.

Mediation services
Spatial proximity alone will not generate the desired communication and cooperation between different activities in the technopole. All French science parks, for example, have a coordination team, the activities of which include organizing business breakfasts and meetings on a specific topic and putting companies and researchers in touch with different experts depending on their needs. The purpose of these teams is to create a social network around the science park's main themes. They work to ensure that entrepreneurs, researchers, students, etc., know each other and are familiar with each other's activities and expertise. In this way, they feel part of a community of interests and are motivated to set up projects together. As the research and business sectors are traditionally not close, mediation activities have a great deal of added value, in that they foster cooperation on profit-making themes. This type of coordination requires an ability to listen and to understand the concerns of all parties, as well as excellent communication skills.

The hosting of companies and company founders
Once the product has been promoted to companies and research institutions, its objectives must be achieved in the day-to-day hosting of activities. Technopoles aspire to be more than a business parks; they therefore provide highly professional hosting facilities, taking into account the technical, administrative, financial, and personnel requirements of the company and its employees. Companies are keen to benefit from an all-inclusive package. This often means that the science park must act as a network leader, linking any existing services likely to meet company requirements and providing a single point of contact. These services are generally provided by the technopole's coordination team, which also promotes and markets the operation.

Services provided by service companies on the site
One tends to forget that the service companies operating in a technopole contribute to the private services available on the site. These may be law firms, accounting firms, engineering and design companies, etc. It is therefore important to include them in the site's strategy and program. Indeed, innovative companies have an acute need for private, highly specialized experts in these areas.

All these coordination, promotion, and marketing services generally take the form of association-type structures, funded and managed by local authorities, universities, and partner companies. These activities must be subsidized, as some of them are not profitable.

3 Conditions for integrating a science park into the host metropolis

3.1 Links between the science park and the urban functions of the metropolis

Other advantages are related to the urban dimension of parks, such as good transportation links with the city center, easily accessible schools, university health centers and cultural services.

These links are essential to the success of the science park project. They provide the actors (entrepreneurs, researchers, financiers) with the services and facilities they need to develop their activities within the metropolis, and include:

Transportation infrastructure
It is vital for a science park to be easily accessible from the center of the metropolis, railway stations, and airports, and from the infrastructures connecting the metropolis to the regional or national urban network. Science parks should never be cut off from their environment. They should be designed to act as nodes in an already well-structured communication network. Silicon Valley, which is legendary for its innovation, does not, like many European metropolises, for example, have the mass transportation infrastructures commensurate with its potential. This is regarded as a disadvantage, harmful to the quality of life in the region and, in the long run, its economic efficiency. Furthermore, the trend rate of growth in the price of oil is pushing people to leave the suburbs and move closer to city centers; this is causing a substantial rise in city center property prices and may, in some regions, impoverish the suburbs. Today, many technopoles are located on the outskirts of cities. In view of these developments, designers should be integrating into their initial plans collective transportation infrastructures, or new, lower CO_2 transport solutions (if these do not exist in the metropolis)[16].

Personal services (education, health care, leisure, culture, etc.)
These are major selling points, and should be factored in when defining the science park project. Entrepreneurs, researchers, and their families, on the one hand, and students, on the other, all have educational, leisure, and cultural requirements. The cultural influence of a metropolis, alongside the research or business environment, is often a factor in the decision of researchers or entrepreneurs. Where several locations are possible options, this can be decisive. In the same way, high-quality, often multilingual, schools (primary, secondary, universities) are a highly attractive feature for families[17]. It is important for science park projects sponsors of to ensure that the host metropolis has the cultural and leisure activities needed by their target populations. In the competition between international metropolises, quality of life and cultural vibrancy are increasingly emerging as selection criteria. Hence, Barcelona, Milan, London, and San Francisco attract highly qualified tertiary workers.

Accommodation and jobs for partners
Many metropolises across the world have become very expensive for young graduates and their families. The price per square meter on the French Riviera (Sophia Antipolis), and in London, Paris, and California (especially in city centers) has become prohibitive for students, young researchers, and entrepreneurs. Now, it is difficult to attract young, innovative people without appropriate housing. Moreover, this is becoming a vicious circle, as the more attractive the metropolis, the more expensive it is, and the more difficult it is for young company founders or researchers to find a job at an adequate salary. As it takes time to develop appropriate housing for these populations, this requirement should be taken into account when defining the science park project. In the same way, the question of employment for partners is crucial, and is instrumental in drawing highly qualified people to a metropolis or region wishing to develop a science park project[18]. Moreover, some metropolises set up a job-search service for partners of researchers or workers they wish to attract[19]. In the knowledge economy, qualified jobs are becoming drivers of growth. A good supply of housing and jobs is needed to attract the talent that will bring the science park project to life.

16 This issue has an impact on technopole programs. Indeed, the use of private cars requires large car parks, which are often under-estimated by project developers and which also take up space that could be allocated to higher added value activities. **17** It is not surprising that Sophia Antipolis offers primary and secondary schooling in several languages. It would not be possible to attract executives and researchers without providing this type of service for their families. **18** This question can be extended to include the local labor market. Employees or company founders will be attracted to a science park if the local labor market is healthy enough to provide them with other possibilities if their career plans do not work out. **19** In Lyon, Marseille and Paris, this service is provided by economic development teams, in cooperation with local science park coordination teams.

3. Conditions for integrating a science park into the host metropolis

3.2 Contributions to metropolitan development

Cities and metropolises also benefit from the location of parks within the urban perimeter. The impact of science parks on metropolitan development is usually measured by criteria such as the number of jobs created or of new companies registered. More indirect effects, such as the diffusion of innovation or growth to the surrounding city or region, are also acknowledged.

The socioeconomic impact of the science park
(see also Chapter 1, Sections 4.2 and 4.3)
For a metropolis, a science park is a symbol of modernity, a host for technology companies, and a cluster of spaces dedicated to fostering communication and joint projects between companies, researchers, and students, all within a network of support functions. It is, however, difficult to assess the diversity of the impacts of a science park on metropolitan development. Nevertheless, various elements can be analyzed, such as the number of companies attracted to the science park, the number of jobs created as a result, the property built, etc. (see Box 3.2).

Box 3.2

Evaluating the science park effect in France: a few examples and figures

One measure of impact is the number of companies created within the zone of influence of the science park. For example, around 400 technology companies have been created in 20 years in the business incubation center (BIC) of the Montpellier science park.

In 2007, 1,086 new jobs were created by member companies operating on the quality-certified sites of the Rennes Atalante science park. Sophia Antipolis has created 30,000 jobs in 1,410 companies over 30 years; 54% of those employed are managers. Most of the jobs created are in engineering, management, and skilled services.

The impact of a science park can also be assessed by the amount of property developed and marketed. For example, 450,000m^2 of property have been developed in Sophia Antipolis over three decades.

Nonetheless, data on these elements are not necessarily available, and in any case it is difficult to relate them to a specific science park effect. The effects, if they exist, are very indirect. This type of impact depends on the attractiveness of the education and research establishments in the science park and, even more, on the quality of the people working there.

It may also be possible to assess the impact of a science park on the basis of more qualitative elements, such as the reputation or the satisfaction rate of the companies operating there, which are often, moreover, members of the science park association[20]. In any case, given how keen local politicians are to organize tours of their local technopoles and parks, their importance for the economic promotion policy of a metropolis is clear.

Diffusion of innovation from the science park through the metropolis
Several factors operate in favor of a growing geographic concentration of research, education, and business in specific locations[21]. It should be noted that:
• By aiming for a higher level of integration between research, education, and business than exists today, it is possible to promote cross-fertilization between the academic and business sectors and the creation of a shared culture. This points to the need for spaces and organizations that contribute effectively to the integration of these sectors;

20 Companies setting up offices in quality-certified technopoles often, but not always, join the coordination committee. These committees also have members who are not located on the site (e.g. Rennes Atalante).
21 According to the Urban Planning and Development Institute of the Ile-de-France region (IAURIF) roundtable held on 14 September 2006.

• Several territorial levels (local, regional and international) must interact around the central locations in which activities are concentrated, so that these locations play a role in connecting and combining cultures and engineering projects, on behalf of the many networks feeding into them[22];
• Ambition, audacity, and creativity emerge as essential factors for creating these new spaces on the basis of the existing structures and for making them sufficiently attractive to researchers, students, and companies looking for truly innovative environments that bring real added value to their activities.

The dynamic of a science park spreads through the metropolis in two ways: by contributing to the dynamics of the local or regional innovation system and through the development and marketing of specific spaces. By targeting new functions relating to the innovation chain (incubation, company creation, technology transfer), the science park will have a widespread effect on the metropolis and beyond. Hence the science park becomes a technopole, i.e. a metropolis that acquires science park functions in order to boost its economic development and its appeal to highly qualified workers and innovative companies.

3.3 Appropriation of the science park by inhabitants and companies in the metropolis

These positive effects can be expanded if they are made visible through an active communication policy, notably through the local media, and if urban citizens are aware of the park's potential to succeed.

The success of a science park also depends on its appropriation by the companies and inhabitants of the metropolis. The vocation of these sites is to become a new neighborhood in the urban environment in which they are located. Excessive specialization in science parks can turn them inward, rather than outward. The management and maintenance of a science park should facilitate its integration into the economic fabric of the host metropolis.

The sponsors of science park projects are aware of this. They are well on the way to accomplishing their objectives when the city's inhabitants visit the site or show other people around it as a leisure activity or when the local press reports the latest developments in the park and prints articles and photos whenever a new company moves in.

Nevertheless, the appropriation of a science park by the local population is not easy and takes time. In Brittany (France), the local press has been reporting on "the" Rennes Atalante science park for over 20 years (although the park is multi-site and multi-polar), but still hesitates over the different sites, the physical locations of companies and the more complex coordination functions.

Architectural and urban elements can be useful in creating a link between a science park and the local population: site entrances, for example, are important and must be carefully thought out. In any case, the knowledge economy, agglomeration effects, and innovation chains are still very specialized subjects and require a permanent education effort. Science park coordination committees should cooperate with the media in this task, by explaining that technopoles contribute to the development of the future economy, and giving very concrete examples of results.

However, popularizing science parks raises the same issues as popularizing the social repercussions of science. Only a small number of people and activities are concerned, compared with all the other economic activities in a region. It is important to stress the need for patience regarding results, but, at the same time, to communicate effectively and insist on the important contribution made by science parks to the innovation economy.

22 For Marseille, for example, the international sphere consists primarily (but not only) of the Mediterranean area. At present, this area is made up of developing countries; however, in view of current demographic trends, these countries will provide a very significant consumer market by 2020.

CHAPTER 4

FINANCING SCIENCE PARK ACTIVITIES

1. Introduction
2. The financial environment
3. The funding options
4. Key points

Highlights

The funding of science parks involves various stages, from conception to implementation, and the mechanisms differ according to the nature of the investments, which can be of two kinds: direct investment in physical infrastructure and investments in the projects and companies located within the park. Public funding takes a long-term perspective and addresses the design and construction stage, while private operators' involvement is best suited to investments in operations and production.

This chapter presents the technology / product life cycle and the different funding requirements at each stage: research, incubation, and start-up; proof-of-concept and product development; market development and exit through mergers and acquisitions (M&A).

The science park funding package must cover all financial needs in the development chain. The funding schemes accommodate different levels of risk with a tailor-made set of financial services and project financing capabilities for the new ventures (both spin-offs and new projects) generated within the park.

Whatever the nature of the entity that manages the science park or the technopole (public or private, profit-maximizing or not-for-profit), the park management must be sure to take a long-term view when planning the park's financial structure and must focus on ensuring the sustainability of its activities. For this purpose, managers should take into account the needs and opportunities of the market as well as the possibilities for mobilizing potential partners (banks, universities, target companies, other science parks).

A careful selection of tenant companies, with a broad portfolio to minimize the negative impact on the business of any changes in customers' financial position, allows the management to support the companies welcomed into the park or the technopole.

Different parks use different techniques for this selection: Helsinki Science Park, in Finland, chooses projects based on the quality of the research already carried out; Cap Digital, in France, selects tenants according to their potential to receive funding from a financier and requires applicants to present their business plan according to the format used by the most likely financier, thereby facilitating fast tracking of the best ideas and even adapting the technopole's timetable to that of the financier.

The matrix below offers a good summary of the main sponsors and stakeholders, their objectives and financial characteristics.

Sponsors and stakeholders	Characteristics	Possible objectives for involvement	Financial characteristics
Local, regional or national government	• Can play a key role in partnership formation and organization and delivery of business support programs • Essential partner in applications for significant funding grants from central government	• Economic development through increasing either the number of companies (business incubation and mentoring process) or the size of existing companies • Science and Technology Parks are a key economic development tool and marketing asset.	• Take the responsibility of the feasibility phase design • Long-term commitment is required in construction payback • Overall legislative and financial framework can encourage investment from private operators
University or other tertiary institutions	• A stable organization with a reputation for reliability • Likely to be short of funds to invest in development of an innovation pole • May have land adjacent to campus to contribute	• Technology transfer • Moving technology up the value chain through spin-out companies • Income from contract research or consultancy	• In need of revenue-generating model to harness insitution's potential • Major source of spin-out leads • International networking useful to collaborative projects
Research centers	• Large government research centers might establish a park as part of a privatization process or to enhance commercialization activities	• Technology transfer to ensure government-funded science base connects more closely to business • Outsourcing of work to spin-out companies created as part of an industrial restructuring activity	• In need of revenue-generating model for internal and external clients • Key player in origination and funding of collaborative projects • Engineering and prototyping funding needs

Complementary information on the challenges and main features of the financial sector in MEDA countries is provided in Annex 3, p. 139.

1 Introduction

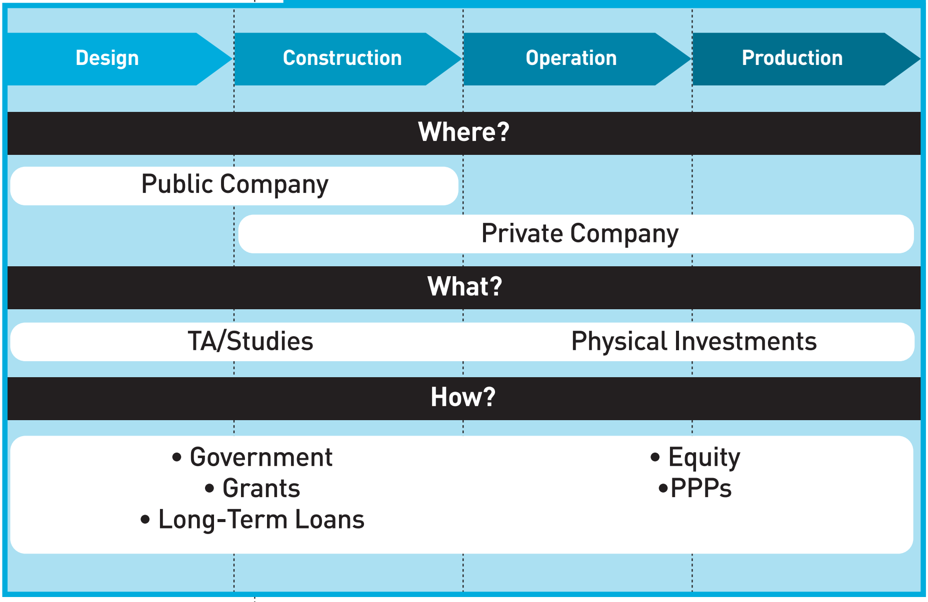
The funding of a science park involves different stages, from conception to implementation.

Funding mechanisms differ according to the nature of the investments. They can be of two kinds: direct investment in physical infrastructure, usually by the science park governing body and characterized by long-term payback; and investments in the projects and companies located in the park, managed by the companies themselves, by local financial institutions, and by venture capitalists with short- to medium-term payback requirements.

The two kind of investment are clearly illustrated in Figures 4.1 and 4.2. Figure 4.1 shows the different investment stages for the public governing body and the private operators. Public funding takes a long-term perspective and addresses the design and construction stage; involvement of private operators is best suited for investments in operations and production.

Figure 4.1

Investment stages for public governing body and private operations



The funding package must cover all financial needs in the development chain.

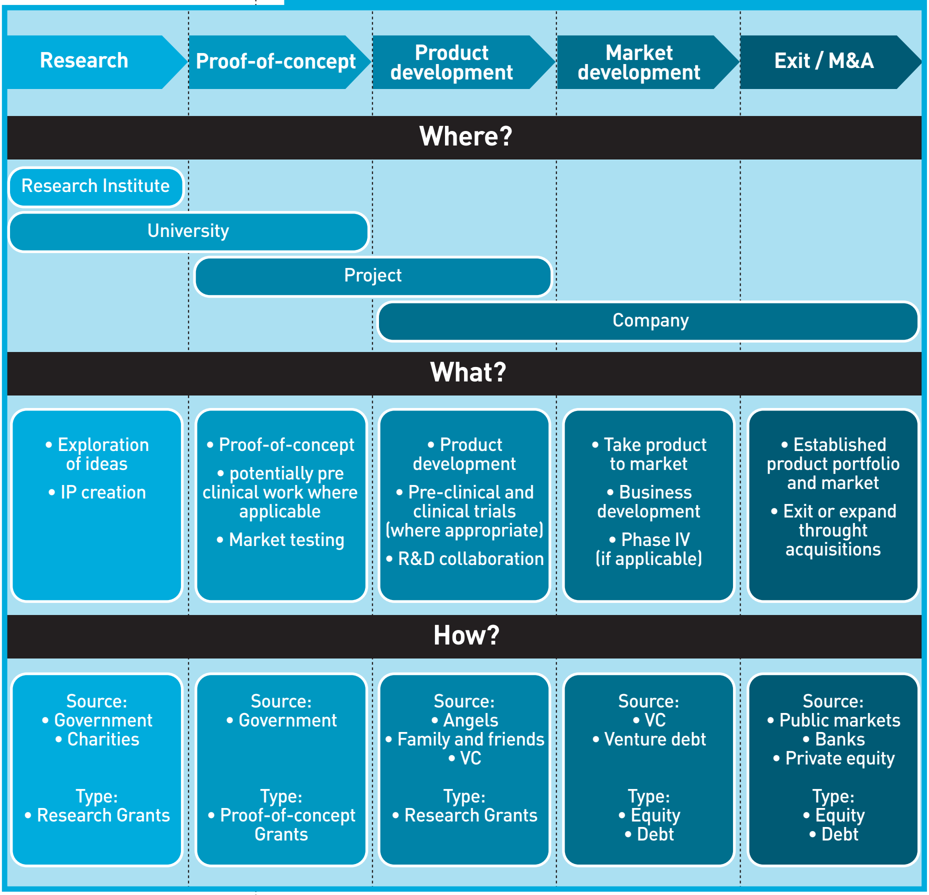
Figure 4.2 gives an overview of the technology product life cycle and of the different funding requirements at each stage:

- Research, incubation, and start-up;
- Proof-of-concept and product development;
- Market development and exit through M&A.

Funding schemes are expected to accommodate the different risk levels with tailor-made financial services and project financing capabilities for new ventures (both spin-offs and new projects) generated within the technopole.

Figure 4.2

Technology product life-cycle and funding requirements



While funding requirements may differ in developing and developed countries…

Companies in developing countries are seldom directly involved in research and development (R&D) activities aimed at producing radically new products or processes. They tend to be oriented towards imitating, adapting, and / or improving technologies that are already available in the market. The traditional focus on informal innovation activities in developing countries creates a different set of requirements for the design of technopole financing packages. The following sections identify and analyze these requirements.

2 The financial environment

…policy makers pursue common objectives and provide a comprehensive range of financing instruments tailored to the needs of firms. The roles of the different stakeholders are also similar, starting with policy makers and governments…

This section looks at the roles of policy makers, specialist funding agencies, academic institutions, private investors, and science park management and at the funding arrangements which may prevail at each of the various stages of development.

A science park is a dynamic, project-focused entity which requires a flexible organizational structure to allow for creative and integrated financing, tailored to tackle interventions at any stage of an individual business case. Given the need for flexibility, the following discussion is not intended to be prescriptive; it applies to a variable extent to each country and situation. It emphasizes actions that are appropriate for a particular context.

2.1 Policy makers and governments

Regional and national governments have three complementary tasks:

• To provide a suitable general financial and legislative framework for the development of innovation;
• To promote initiatives for financing large R&D and industrial development programs;
• To assume the role of primary promoter, and therefore primary financier, of the technopole at least during the early stages.

…as providers of the financial and legal framework for the science park.

In a first phase, the state should, when necessary, revise financial and legal frameworks to adapt them to the needs of innovation financing and international financing. These frameworks should be extensively published in clear and comprehensive documents and brochures. They include legislation in the following areas:

• Banking;
• Bankruptcy;
• Labor;
• Foreign investment;
• Business (equity, shareholding, dividend distribution, etc.);
• Stock market;
• Risk capital;
• R&D financing;
• Insurance;
• E-commerce;
• Technical standards (measurement and tests).

Many good practices can be found around the world. For instance, Finland, the United Kingdom, and Portugal have "one-stop shops" at which a company can rapidly complete all administrative set-up procedures and find a range of other services (such as commercial networking, finance applications, partnership building, specialized service provision, etc.).

In the Mediterranean countries, policy makers must work primarily to increase their countries' financial attractiveness to investors (both domestic and foreign). International financial institutions (e.g. the World Bank, the EIB) can provide assistance for establishing the necessary regulatory texts, as has been the case with the development of mining codes in southern African nations.

In terms of policy measures aimed at research and innovation, governments may decide to employ fiscal policy, directed either toward technopole customers (e.g. a reduction in the tax payable on rents) or more generally, (tax credits for R&D spending, as in France and the United Kingdom). While such measures imply a reduction in income for the administration in the short term, they may lead to increased wages and profits and thus to new tax revenues in the future. Most frequently, policy makers assign priority to certain sectors or regions and allocate funding on this basis, sometimes through specialist institutions (see below).

Such government actions will help to address gaps in credit, equity, and insurance markets which constitute a key difficulty for firms wishing to invest in innovation in the Mediterranean region. Finland illustrates the importance of a positive financial policy environment and of a strong private sector commitment: in 2005, an impressive 3.5% of GDP was spent on R&D but less than 25% of that amount was funded by the Finnish Government.

Other financial laws which can strongly affect the business context include the bankruptcy law, which can be more or less restrictive for entrepreneurs willing to start over, and the legislation for technical standards, measurement and testing, which can attract or discourage foreign investors (Singapore's open policy regarding medical experimentation, among other factors, has made Biopolis a scientific hub that attracts world-class scientists).

The role of policy makers as promoters of initiatives for financing large R&D programs should also be emphasized.

One should bear in mind that the start-up and early stages of projects are the most difficult to fund through private finance, as these stages carry the highest levels of risk. Thus government grants and awards, administered through a variety of public bodies / ministries (TEKES in Finland, Research Councils in the United Kingdom), are invaluable vehicles for seed-stage projects. In general, market failures – the lack of private interest in investing in these risky R&D ventures – justify government intervention as a mechanism which does not distort free competition.

In developing regions, market failures, especially involving financial constraints, are very much in evidence, and non-fiscal instruments may be more important than fiscal ones. Neither imitation nor adaptive innovations are exempt from risk, as they are far from trivial activities, and thus can benefit from strong non-fiscal support.

In Europe policy makers' initiatives include special loans from EU credit institutions, grants from national agencies, and funding from subnational authorities.

In Europe public intervention takes place at various levels, such as:

• The European Union: the European Commission, for example, encourages a range of specific lending priorities for the European Investment Bank (EIB), the EU's multilateral development bank, including the promotion and financing of joint technology initiatives, European technology platforms and other large-scale R&D projects;
• National agencies: for example, in order to bridge the gap from idea development to market application, TEKES in Finland, SENTER NOVEM in the Netherlands, and IPI in Italy finance R&D and technology transfer projects directly;
• Regional governments: for example, the Spanish government and some regions have assigned priority to the biotechnology industry, and the Barcelona Science Park receives funding from the Catalonia region. As the park has no source of private funding other than income from rents and services, grants from the national and local authorities are crucial to support the construction and maintenance of the Science Park's infrastructure, in particular the R&D infrastructures;
• Specialized institutions: for pre-diagnosis studies, Minalogic, France, receives half of its funding from INPI; the other half comes from "Pole de Compétitivité" funding.

In the case of regional governments, above, funding is given to the technopole as a whole. An alternative is for the government to provide funding to specific services within a science park, as in Jordan's iPark ICT Business Incubator (established under the Higher Council for Science and Technology).

In addition, certain governments in the Mediterranean area (e.g. the Moroccan authorities for the Casablanca Technopark or the Tunisian authorities for its Sfax counterpart) have already implemented projects and funded websites for local businesses and for the establishment of incubators within academic institutions following the US technology transfer model.

2. The financial environment

Central governments often promote science parks directly, but support can be temporary.

In many countries the central government is involved in the launching and funding of parks. This makes sense, since technopoles are long-term projects which require large investments but of which maximization of profits (e.g. through market rate rents) is often not the primary goal. Through science parks, central governments put in place a sound regional policy aimed at increasing long-term economic and social wealth in the region and the country. For example, Tunisia's ambitious plan to develop 12 technopoles around the country is clearly not only an initiative to increase local competitiveness, but is also a key medium- to long-term goal of the government's economic development policy. The funding instruments available range from interest-free loans and government grants to state guarantees for commercially arranged debt.

However, continuous public initiatives are not necessary. Technopolis, in Finland, is an example of virtuous evolution of a concept originated by the public authorities, which began life as a joint venture, promoted by the Finnish city of Oulu, and subsequently became a largely privately owned company, presently quoted on the Helsinki stock market. Its focus is the development and management of Incubators.

2.2 Specialist funding agencies

Alongside the explicit role of the central government, a multitude of specialized agencies can operate at arm's length from the executive branch.

Specialist funding agencies, often with strong links to states or international organizations, also offer funding both for the initial construction of science parks and for encouraging innovative firms to invest in these parks. Because of their special status (many operate on a not-for-profit basis), regional development agencies are able to offer facilities specifically suited to the promotion of innovation. These may include more favorable loan terms, willingness to accept greater risk than private investors, and / or the provision of smaller loans for start-up operations. They can play the role of one-stop shop for firms and intermediaries. As these are policy-driven investors, it is important for project promoters and science park managers alike to ensure that the aims of these agencies, particularly those based outside the country, are fully in line with the aims and objectives of the science park or technopole as a whole.

Generally speaking, agencies act as providers either of equity or of debt. Sometimes, however, the agency plays a number of roles. For instance, the Algerian ANSEJ (National Agency for Support to Youth Employment) works to help young entrepreneurs obtain a tax exemption on their activities. In the past, ANSEJ has been criticized for its bureaucratic nature, and this serves as an important reminder that agencies aiming to support development must be careful not to allow their internal functions to outweigh the benefits they bring.

Morocco's ANPME (for SMEs) does not offer finance directly, but rather works to simplify procedures for all entrepreneurs, an important role in the overall process of project development.

They provide equity or…

In terms of equity investments in start-up companies, the most committed agencies in the Mediterranean area are arguably in Tunisia and Turkey, where the FOPRODI and TTGV respectively use state (Tunisia and Turkey) and international (Turkey) funds to invest in equity at the important early stage of innovation development. Tunisia also has a government seed fund, Ikdam, launched in 2005. Turkey's range of later-stage private equity options include KOSGEB, which provides support to new entrepreneurs in business development centers (similar funds could presumably be established for innovation poles) and Turkven Private Equity, a fund which provides both equity and long-term loans, with a number of European investors, including the EIB.

The presence of the EIB highlights the absence of equivalent private sector funding. The EIB is also active in other funds, both local (e.g. Byblos, Lebanon, and Capital & Partners, Tunisia) and cross-border (the AlterMed fund, operating across the Mediterranean). In fact, bilateral and multilateral agencies provide much of the funding for private equity vehicles in the region. Other international financing opportunities come from organizations such as the EIF, the EIB affiliate which operates as the EU's venture capital fund; its products include a technology transfer accelerator which provides equity for the seed stage.

There are also certain highly targeted programs, such as the incubator MAWRED for women in the Lattakia Governorate in Syria. Such programs serve to remind users of technopoles that the search for financing may lead to some very specific responses.

…debt financing.

For later-stage funding needs in innovating companies, as well as for large-scale infrastructure projects, debt financing may be an attractive option, especially as it need not lead to any loss in operating control.

Here again, specialist agencies can offer relevant support in an attractive package. Loans are frequently offered by savings banks, many of which (such as the Caja de Ahorros de Cataluña) have programs designed specifically to support the communities in which they operate. Indeed, the German Sparkasse system has allowed projects such as the Heidelberg Bioscience project to benefit from credit at reduced cost via the state's guarantee of sparkesse operations. The Lebanese organization Kafalat, backed by the Institut National de Garantie des Dépôts, also uses its state guarantee to provide onward guarantees for bank loans to innovating companies. To be eligible for a Kafalat contribution, the borrower must prove his / her own commitment with a 10% contribution. Similar schemes are found in the United Kingdom (Small Firms Loan Guarantee) and in France (SOFARIS). International organizations such as the EIB are another important source of financing, offering a wide range of financial instruments. Financing is generally available for funding of R&D, although each organization may have specific eligibility criteria.

The allocation of funding from prestigious international or state-guaranteed institutions can act as a catalyst for other financiers to join a project, owing to the positive governance / best practice guidelines which these institutions often impose. Other positive aspects of loans from specialist institutions include the availability of long repayment terms, or, at the other end of the scale, the provision of internationally funded microfinance through local banks (for instance, the EIB's joint facility with KfW and IFC for Syria). From the point of view of international financial institutions, the use of partner banks makes it possible to channel large-scale international finance into appropriate products for a local, often risky market, which may otherwise be ignored.

2.3 Academic institutions

Higher education institutions (HEIs) increasingly not only supply expertise as partners of other stakeholders in the science park but also fund innovative projects.

Academic institutions (universities) play a very important role in a science park since they are usually involved in the overall science park project, participating as public actors, specialist institutions, park managers and tenants (through start-ups). HEIs are able to provide substantial technological know-how to firms and start-ups, but they also have a particular role in the financing of science parks. Through their own funds (endowments, fees, etc.) as well as state support, universities can act as promoters of technopole infrastructure projects.

For example, for the Barcelona Science Park, the University of Barcelona, a prestigious institution, brings subject-specific expertise to the project and plays a joint role in financing. This is important as the university's debt is consolidated with that of the Comunidad Autónoma Cataluña, meaning that it is a low-risk partner for any external investors.

2. The financial environment

In Finland, another model is being contemplated, which makes the University of Helsinki a joint main shareholder (with the City of Helsinki) of the Helsinki Science Park, partly because ministries are not allowed to own real estate assets. In this case, the university is the representative of the Finnish state.

Finally, in the United Kingdom, state-supported, university-administered seed funds allow universities to promote particular projects and thus increase the likelihood of the university receiving a boost in income, if a spin-off eventually offers equity to the academic institution which nurtured it.

2.4 Research centers

Research centers supply R&D results and interact with firms to commercialize research outcomes. Funding schemes are crucial to bridge the gap between research and innovation, especially in developing countries.

While the aim or "business" of academia is the production of knowledge, the mission of research organizations is quite different. Their main objective is to increase their profitability by improving the efficiency of industrial processes and providing various outputs. Accordingly, there is a market for R&D activity in research centers, and this market is an integral part of the organization's corporate strategy. Knowledge produced in science parks can supply this market.

The goals of research centers are two-fold. On the one hand, they have to create their own competitive advantage by maintaining a leading position in advanced knowledge production for industry clients. On the other, particularly in developing economies, research centers play a strong educational role for companies (teaching them how to transform, engineer, and develop technologies into products) and at the same time an absorptive role (in response to industry demand and needs, research centers "absorb" knowledge produced in parks and transform it into a technical offer).

To fulfill their mission, research centers need to set up effective links with science park members. Several types of knowledge originate from the different actors of the science parks, and research centers, to which the knowledge flows, are expected to initiate the innovation process. This feasibility assessment, prototyping, testing, and small-scale versus large-scale plant efficiency evaluations are all core activities of research centers.

The funding of these activities is usually provided by public support schemes focused on collaborative projects. These schemes are very popular in Europe, as demonstrated by the many measures at regional level in Italy, Spain, and Greece, all countries with a strong presence of SMEs.

The need for specific funding schemes for collaborative projects in science parks is particularly important in developing countries. In many cases, local companies do not need finished technological products from a research center but rather a jointly developed result which allows companies to learn by doing and thus overcome their lack of absorptive capacity. Collaborative projects can strongly support the building of a climate of trust and confidence, detection of market needs, and timely dissemination of relevant knowledge within the technopole as a whole.

Commercial banks can be major private investors but they are often risk-averse.

This is less the case for investment funds, which are often keen to invest in innovative endeavors. However few are inclined to provide 100% of the capital, especially in the early stages of a company.

2.5 Private investors

A noteworthy feature of the Mediterranean region is that **commercial banks** show a markedly lower appetite for risk in debt financing than their counterparts in Europe. There are, of course, some exceptions (e.g. the Amen Bank, in Tunisia, which is comfortable with a slightly higher level of risk), but the overall situation requires specific attention.

As mentioned above, both the government and specialist institutions may offer solutions to this relative lack of financing possibilities, for instance through partnerships with local banks to reduce their exposure. Banks are often able to make more rapid decisions on requests for funding than some other investors, as the levels of due diligence can be considerably lower as a result of the security attached to debt within any given financial structure. A positive aspect of involving commercial banks is their broad range of financial products, including short-term funding, which can be of use to a developing organization (e.g. the Helsinki Business and Science Park uses commercial banks to maintain its liquidity).

Investment funds with a focus on innovation projects are the primary source of private equity for technopoles (there remains however a general paucity of private equity for funding the infrastructure side of technopoles).

A key strength of international capital is the wider knowledge context that such investors bring to the company in which they invest. A particularly useful source of market information about funds operating in the Mediterranean area is the list compiled by the ANIMA investment network[1].

In terms of private equity, as for debt, the market in the Mediterranean area is considerably less developed than in Europe. The first Tunisian venture capital fund, SPPI, founded in 1990, has made only 15 investments. Transactions tend to show relatively lower sophistication (e.g. little use of leverage), than would be expected elsewhere. Action on the part of governments, to ensure stability, and science park managers, to promote their organization's activities, combined with the involvement of larger institutional investors to support pilot programs may help to resolve this problem in the future.

Additional points to bear in mind when dealing with private equity within a science park include:

• National investment funds are less keen on early-stage companies (especially in the Mediterranean); international organizations may be able to offer support here (e.g. the EIB's African Lion funds for early-stage mining companies). However, the role of the social network of family and friends should not be neglected, as these are investors who can sometimes fill the financing gap during the early stage, especially in traditional areas in some Mediterranean countries;
• Private investors usually require partners to cover a substantial proportion of the investment costs (30 to 40% for some funds). They therefore cannot be the only source of capital;
• A high rate of return may be demanded, and projects that seem unlikely to guarantee such levels may be excluded. That said, in the Mediterranean (and indeed, in emerging countries in general) the required rate of return tends to be lower. New ways to ensure and assess returns need to be defined in order to safeguard the invested capital, and to reward indirect non-financial and high social impact such as employment creation;
• Although there should be no outflow of cash (in interest or dividends) before the exit of the fund, it is important for the investee company to be aware of the fund's exit strategy and plan for this event to ensure that the outcome is acceptable to all concerned.

Of course, the positive aspects of equity financing can be significant, not least because there is usually no immediate obligation to repay the initial investment, while dividends are at the discretion of the company directors. Furthermore, a strong equity base strengthens the company's balance sheet and increases its capacity to borrow from banks.

1 See www.animaweb.org

2. The financial environment

The final type of private investor is business angels. These are wealthy individuals, often previously successful business people, who wish to invest in new start-up companies.

Business angels are less prestigious than venture capital backing, which may influence the ability to raise other finance. Their investment is profit-oriented and often includes a "technical assistance" component, such as mentoring, to help the entrepreneur's chances of success. The "angel's" confidence in the entrepreneur may sometimes risk being misplaced, but the provision of useful business contacts and finance at an often lower than commercial rate is likely to be beneficial, if managed carefully. In the Mediterranean area, the organization of business angel groups is still in its infancy and science parks in the region may wish to introduce such schemes as part of their activities. A business angels culture can be easily assimilated in developing countries, especially in this region.

Park management must take a long-term view of planning and focus on ensuring the sustainability of the park's activities. Most important are the selection process for tenant companies, promotion and networking initiatives, and communication policies.

In working toward financial self-sustainability, **science park managers** should take into account the needs and opportunities of the market as well as the possibilities for mobilizing potential partners (banks, universities, target companies, other parks etc.).

A careful **selection process** for tenant companies, ensuring a broad portfolio in order to minimize the negative impact on the business of any changes in customers' financial position, allows the management to support the companies accepted into the technopole or park (see Chapter 1). Different parks use different techniques: Helsinki Science Park chooses projects based on the quality of research already carried out; Cap Digital, France, selects tenants according to their potential to receive funding from a financier and requires applicants to present their business plan according to the format used by the most likely financier, thereby facilitating fast tracking of the best ideas, and even adapting the science park's timetable to that of the financier.

The science park manager can also be the financial catalyst between partners for the development of R&D and industrial projects through **promotion / networking** and information sharing. While neither involves the raising of funds directly, the task is significantly more difficult without them. The question of promotion / networking is also covered more fully elsewhere in this guidebook, but with regard to financing, it means promotion in order to attract direct financing as well as clients (who may also bring the potential for increased finance). It may also include the development of networks with other parks, both locally and internationally. In short, the technopole must act in part as an agent for its tenants, with the park's management ensuring that potential investors know about the opportunities available in a given technopole. This is particularly important in the Mediterranean area, given the general need for information about financing opportunities and the fact that incubators and science parks are often not sufficiently connected to grant and loan schemes, business angels, and investment funds.

Information sharing is related to promotion / networking but concerns the internal disbursement of acquired knowledge about funding sources. An example is found at System@tic, France, which organizes annual events to bring investors and SMEs together. The aim is not simply to allow SMEs to find financing but also to allow entrepreneurs to gain from investors a clearer vision, which can lead to more successful innovation. In Mediterranean countries, technopole advice and support can also encourage the use of local business service providers which can respond to investors' expectations and provide input into the post-investment support stage.

2.6 Large companies and SMEs

For the companies in a park, difficulties of accessing finance will differ depending on the size of the enterprise.

Large enterprises (including multinationals) tend to come to science parks in order to outsource their often large R&D and training infrastructures. They are drawn to parks by the offer of low-cost but competent manpower and are particularly welcomed (and indeed actively sought) by park management, as the presence of large enterprises provides strong support for the sustainability of a park's economic model.

As shown above, the emergence of **innovative SMEs** depends on the presence and fluidity of a financing stream which can accompany their growth from the very first stages of development. The role of science parks here is that of catalyst of the chain of innovation, on a territorial level or in terms of a particular branch of the economy, and in terms of project financing. Most importantly, the park funding scheme must be packaged so as to nurture the new ventures created within the science park, by accommodating their differing risk levels with a tailor-made set of financial services and project financing capabilities.

Careful management and investment monitoring, regular communications between actors, a culture of cooperation between science park members, and sound financial management and broad funding packages are a concern of all stakeholders.

Finally, a number of points apply equally to **all participants** in the establishment of park:

- The development phase of the park is the responsibility of all its stakeholders; they must subscribe to and maintain the shared objective of careful management of the available financial resources. Financial monitoring requires appropriate accountability and reporting mechanisms covering: management of cash flow; operating or capital expenses; evaluation of collateral risk resulting from the development agreement; control over land lease arrangements and building lease arrangements, including design, specifications, tenants, maintenance, and operation; and performance clauses regarding appropriate uses of the land;
- The path to finance is frequently indirect, with many agents acting between the original idea (new biotechnology or park infrastructure) and the eventual financiers. This, combined with the speed with which new agents may enter the process and others may leave, means that all stakeholders must be engaged in regular communication about developments in order for the market to function at its optimal level;
- The science park funding package should be a broad one which encompasses the full range of financial needs in the development chain. Funding schemes must nurture new ventures (both spin-offs and new projects) generated within the technopole, by accommodating their different risk levels with a tailor-made set of financial services and project financing capabilities;
- In the Mediterranean area, where innovation finance is relatively less developed, the speed of change is even more significant and necessitates particular flexibility and openness to change. However, funding of collaborative projects is one of the most effective ways to foster research-industry partnerships;
- There is a need to be aware that investments in technopoles will often be long-term, with infrastructure having an economic life of up to 30 years and the goals of development looking even further into the future. Because of this, even at the beginning of the process, exit strategies should be considered by all concerned stakeholders. Furthermore, long-term investment will require constant monitoring, with both investors and investees regularly ensuring that the package is working as intended;
- Above all, the existence of a culture of cooperation among all actors is essential to the success of science parks or technopoles, wherever they are located. Although the role of each stakeholder has been considered separately here, this should not obscure the fact that all stakeholders are ultimately working toward a common goal: success in innovation. Individual conflicts of interest will inevitably arise but must be resolved as smoothly as possible, for it is only in attaining the common goal that individual goals, whether financial gain for an investor or economic and social development for the host government, will be realized.

2. The financial environment

In the light of these conclusions, Table 4.1 shows some of the results presented in Chapter 2, along with some additional financial characteristics.

Table 4.1

Sponsors, stakeholders and objectives

Sponsors and stakeholders	Characteristics	Possible objectives for involvement	Financial characteristics
Local, regional or national government	• Can play a key role in partnership formation and organization and delivery of business support programs • Essential partner in applications for significant funding grants from central government	• Economic development by increasing either the number of companies (business incubation and mentoring process) or the size of existing companies • Science Parks are a key economic development tool and marketing asset	• Take the responsibility for the feasibility phase design • Long-term commitment required for construction payback • Overall legislative and financial framework can foster investment from private operators
University or other tertiary institutions	• A stable organization with a reputation for reliability • Likely to be short of funds to invest in development of an innovation pole • May have land adjacent to campus to be contributed	• Technology transfer • Move technology up value chain through spin–out companies • Income from contract research or consultancy	• In need of revenue-generating model to harness their potential • Major source of spin-out leads • International networking useful to collaborative projects
Research centers	• Large government research centers might establish a park as part of a privatization process or to enhance commercialization activities	• Technology transfer to ensure government-funded science base connects more closely to business • Outsourcing of work to spin-out companies created as part of an industrial restructuring activity	• In need of revenue-generating model for internal and external clients • Key player in collaborative projects origination and funding • Engineering and prototyping funding needs
Tenant companies	• Enhance image and reputation of the technopole • Accommodation to suit needs as appropriate to stage of development • Motivated to be in a like-minded community and close to host or affiliate university or research center • Customized development possible • Room for growth in a campus-style environment	• Gain commercial advantage for company • Solve skills shortages • Ready access to technology transfer and problem solving	• Early-stage seed funds required • Strong demand for take-up services • Business models to be tested • Coaching services to be provided through innovation vouchers • IPR strategy assistance

Source: Adapted from Kirk & Catts NZTE Science and Technology Park Scoping Study.

3 The funding options

Funding options include PPPs (public/private partnerships) are formed for science park infrastructures,...

The funding options for infrastructure depend primarily on the institutional set-up of the technopole and the **respective roles of the public and private sector**. During the start-up phase the public sector often has the main role, in particular to ensure the funding for basic infrastructure such as roads, electricity, water and wastewater. In recent examples in the Mediterranean region, the public sector has provided additional funding for research and training components as well as for buildings for the private sector. For Technopoles Tunisia, the infrastructure work encompasses site preparation, primary and secondary road building in each technopole (as well as cycle and pedestrian paths), parking areas, green spaces, fencing and connection to the drinking water, drainage, wastewater, electricity and gas systems. The science park has quality buildings with standard architectural characteristics. They are primarily intended for teaching, laboratory, and office use and are modular so that they can be adapted for different users.

The private-sector focus is primarily on infrastructure and tangible assets for companies as well as some general services (administration, communication, etc.)

...as well as grants, notably for startups,...

Grant funds or (interest) subsidies are generally be well suited to the expensive start-up phase of parks, in particular for preparatory studies (technical assistance), support for research, and marketing initiatives. Technical assistance is considered crucial to ensure the sound development of new parks in line with defined economic development criteria, which should reflect market demand and capacity requirements. This is also valid for the start-up phases of individual companies seeking to prepare their business plan (feasibility studies, etc.) and to establish themselves within the science park.

For very young companies that cannot attract seed financing, grant funding may be the only source of funding available. The administrative process entailed in accessing grants can be onerous, but it is important to persevere.

Technical assistance (on a grant basis) at this stage can also be very useful. In particular, it is useful for:

• Improving the quality and development impact by strengthening the capacity of public and private sector partners / promoters;
• Financing upstream studies and activities focused on strengthening private sector growth directly or indirectly.

...and loans and guarantees.

In the Mediterranean region, development finance institutions (DFIs) are filling the gap created by the scarcity of long-term funding for basic infrastructure investments as well as economically viable, but non-profitable, investments in science parks in both the public and private sectors. **Loans** provided take the form of credit lines or individual loans (see Table 4.2).

Table 4.2
Loans

Products	Objectives	Beneficiaries
Credit lines	Develop SMEs through lines of credit to local financial intermediaries, which on-lend to their own customers.	SMEs
Individual loans	Develop the economic infrastructure, with special emphasis on private-sector growth and the creation of an environment conducive to private investment.	Private and public-sector promoters

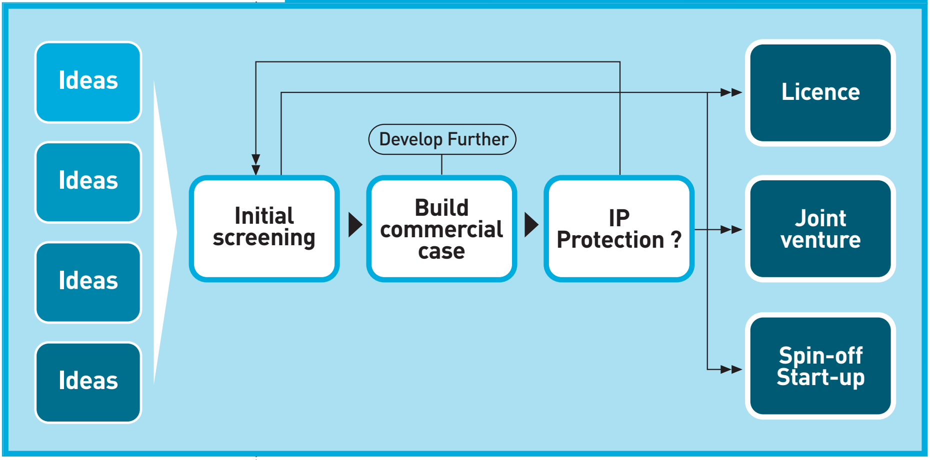
3. The funding options

Guarantees may be provided for senior and subordinated debt, lines of credit (in local currency which may therefore bear foreign exchange risk), bond issues, and the like. The guarantee is either a standard guarantee or a debt service guarantee similar to that offered by monoline insurers.

Depending on the underlying funding structure of the operation, a guarantee may be more attractive than a direct loan. It can provide: higher value added; lower capital charges (e.g. under Basel II, EIB guarantees provide a zero risk weighting to the guaranteed obligation); and foreign exchange risk coverage.

Tax incentives may encourage private investors to invest in the creation of technopoles as well as encouraging companies to locate their businesses there.
The type of financing available for firms will depend on the type of company, how close its product is to market, and the value chain position (see Figure 4.2). Figure 4.3 illustrates the path to the three traditional models of technology transfer (license, joint venture/collaborative projects, spin-off/start-up).

Figure 4.3
Traditional technology transfer models



For new research-based firms, proof of concept is a major challenge.

3.1 Research-based spin-offs and tenants

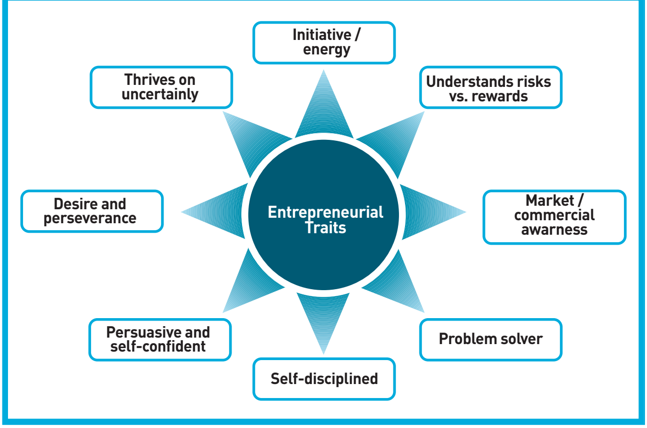
The timing and method of spinning off can be crucial to the chances of success in raising capital, both seed and later stage financing. Forming a new company may not necessarily be the best strategy: an iterative decision-making process needs to be triggered so that the technological (technical feasibility, testing results) and non-technological variables (intellectual property, market readiness) are sufficiently developed for commercialization. Evaluation of the business model is the primary task.

A new company may be appropriate under the following circumstances:
• No company is ready or able to take on the project on a licensing basis (however, if licensing is not an option because the intellectual property (IP) is insufficiently developed, using the IP as the basis of a new company may not be the best option as future investors may have reservations);

• The invention consists of a portfolio of products or is an "enabling technology" capable of wide-reaching applications. An example in biotechnology could be the tools and reagents sector in which the time to market (and revenue generation) is significantly shorter than, for instance, for a drug discovery project;
• The inventors, internal or external, have a strong preference for forming a company and are prepared to invest their time, effort, and perhaps money in the start-up. The needs of the inventors are paramount, but this alone should not drive company formation. Also, not all inventors make good entrepreneurs, as overcoming the challenges facing a new company faces requires a number of vital qualities which are not universally held (see Figure 4.4);
• There is strong customer pressure from industry to set up a company to maintain and further develop leading-edge products or services. This can be a strong driver for spinning off a service-based business model if customers expect to deal with a company and not a university;
• Potentially higher returns can be gained from the creation and growth of a new company compared with a licensing strategy.

Figure 4.4

The characteristics of a successful entrepreneur



The university spin-off model is often based on mature intellectual property to be exploited on the basis of funding options linked to the different development stages of the new company (see Figure 4.2 above).

Another consideration when transfering IP from a university project to a new company is the means by which the IP is transferred from the university to the company. Essentially, there are two options:

• license the IP to the spin-off in exchange for equity and royalties;
• assign the technology to the spin-off, usually in exchange for equity.

The first option is good for the university if the company fails, but bad for the investors who want the IP within the company. Hence, spin-offs that will be capital-intensive should choose the second option as this will more easily attract external investment. However, optimism about the chances of success should not lead to overvaluing the IP. A significant equity stake for the university can be a burden for the company when it seeks external financing.

3. Funding options

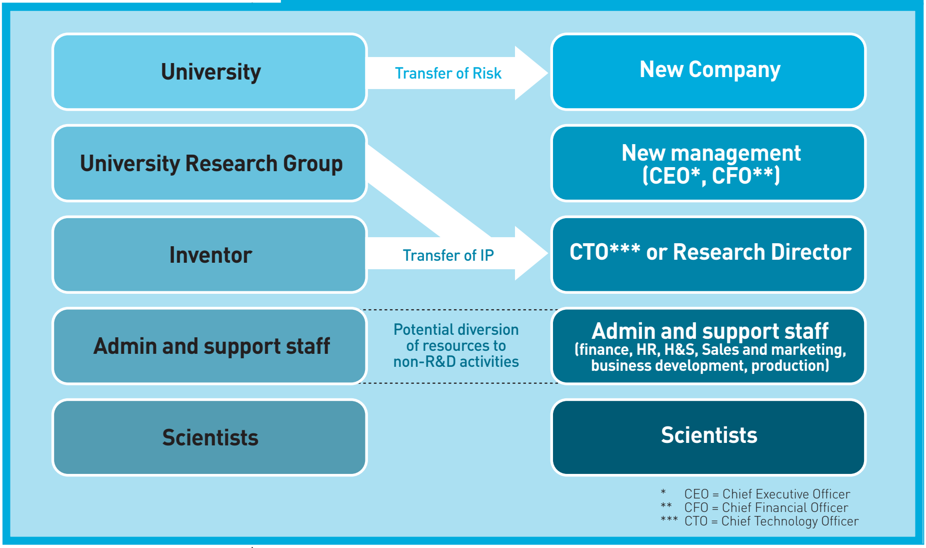
In another scenario which may favor licensing, the company is based on university IP, but the inventors foresee creating original IP which does not stem from the original university project. If equity were exchanged for university IP, the university would have a share in all future IP created in the company by the inventor, even if this new IP were completely independent from the original university IP.

For university spin-offs, it is important for inventors to team with experienced managers to increase the chances of survival.

Once the decision for spinning off has been made (and the IP has been assigned or licensed) it is important to be aware of the requirements and challenges the new company will face. Moving from the university to a commercial context creates several new responsibilities. Surrounding the inventor with experienced management can help deal with these challenges; it is also critical for attracting investors to the company and hence ultimately for its chances of sustained success.

Figure 4.5

Migration from academia to a commercial context



(The scenarios described in Figure 4.5 also apply if the IP is generated within a research organization or any other R&D activity.)

As the company matures it will face several "life events" which may significantly affect its growth path.

The company's potential strategies needs to be considered early in its life of a new company and continually reviewed throughout its maturation. Figure 4.6 outlines these events and strategies and can be used as a reference tool.

Figure 4.6

Strategic review of the spin-off life-cycle and decision making process

Product commitment

	Key Decision Points
Strategy	• How and when should we commit to a product? • Which markets (population, location, etc.) should we pursue? • How can we balance the significant resource needs for the committed products with the needs of other programs?
Operations	• What processes should we implement to ensure a disciplined approach?
Finance	• How much do we expect to spend and how do we track it?
Organization	• Who should participate in the commitment decision?

Product alliances

	Key Decision Points
Strategy	• Should the company form an alliance to bring a product to market? • What type of alliance (development, commercialization, etc.) do we need? • Who are the ideal partners and how could we approach them?
Operations	• How can we implement an alliance process to allow collaboration while preserving other intellectual properties? • How can we balance our internal projects with the alliance projects? • How do we monitor the success of our alliance relationship(s)?
Finance	• What is the value of the product's risk / benefit to us and to the potential partner? • What is the most important financial element - cash, equity, future revenue, etc.? • What risks are we willing to take in terms of trading control for assistance?
Organization	• How can we make sure our partner will be committed to developing our product? • Who should lead and monitor the alliance relationship?

Commercialization

	Key Decision Points
Strategy	• How can we best position our product in the market? • How can we maximize pricing / reimbursement while minimizing costs? • How should we price the products?
Operations	• How can we monitor, track and respond to adverse events?
Finance	• How much should we spend to support various commercialization activities? • What processes do we need to track various transactions?
Organization	• How can we build a customer-facing organization while ensuring regulatory compliance? • What are the key talents we need?

Mergers and acquisitions

	Key Decision Points
Strategy	• Should we acquire / be acquired? At what price? • How will such an event deliver appropriate shareholder value? • Can we really deliver the promised synergy?
Operations	• What processes should we implement to ensure the successful execution of the deal?
Finance	• How can we maximize the tax benefit of the acquisition?
Organization	• Do we have the right cultural fit with our partner?

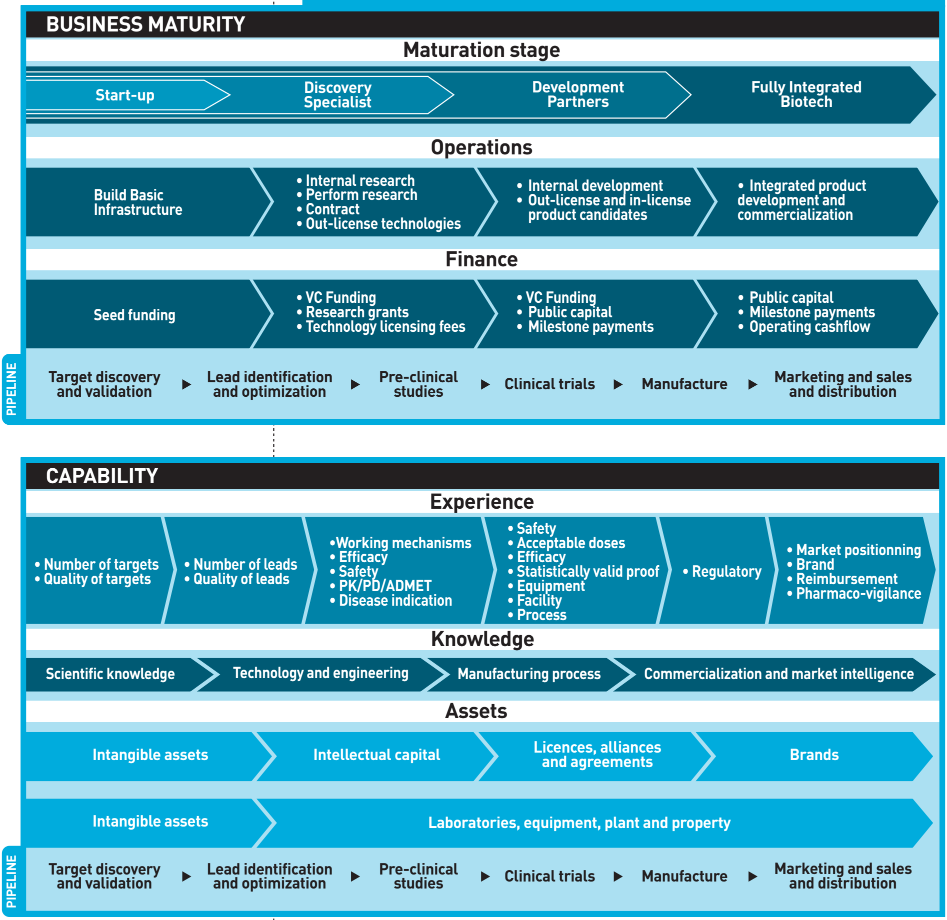
3. Funding options

> Capitalizing on university innovation through a spin-off requires a strong focus on the business model and careful consideration of the "when?" and the "how?"

To sum up, new spin-offs tend to come from university-generated innovation. Once the company is set up, the principle of survival of the fittest applies. It is therefore important for the basics to be in place to give the company the best chance of survival. Figure 4.7 highlights the different evolutionary steps in developing market maturity and technical capability, taking as an example the biotechnology sector pipeline.

Figure 4.7

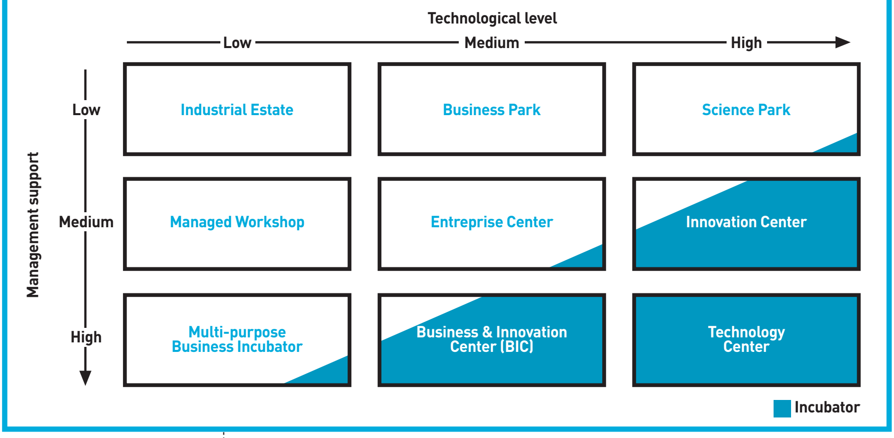
Evolutionary steps in the biotechnology pipeline



Next to the life cycle and funding requirements of potential tenant companies in a technopole described above, it is also important for the right kinds of support and services to be offered to these companies. A comprehensive description of these services is provided in Chapter 2. Figure 4.8 shows the main types of start-up support, including the business incubator and the science park.

Figure 4.8

Business incubator management support



Source: European Commission, 2002, Benchmarking of Business Incubators, Brussels, p. 6.

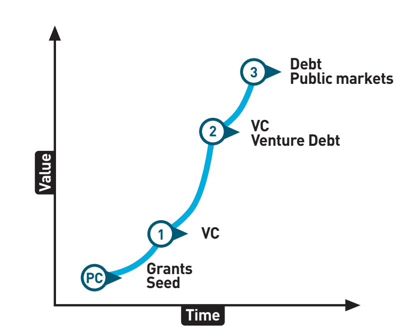
As Figure 4.8 indicates, the level of management support is higher in the incubator than in the science park generally. It is also important to consider the value added within the park resulting from shared access to accounting, secretarial services, and legal support. This can reduce the costs for each tenant company individually but through the pooling of resources still guarantee high-quality services.

3.2 Start-up companies

Figure 4.9 traces the usual financing path for start-up companies. Investors take considerable risk in terms of the time needed before the business yields positive cash flows. Hence, equity is normally the type of financing available. There are also a number of hybrid instruments, which combine elements of debt and equity and which may be an option for start-up companies.

Figure 4.9

Financing path for start-up companies



3. Funding options

Again, it is to be noted that for very early-stage companies that are unable to attract seed financing, grant funding may be the only source of funding available. The administrative process entailed in accessing grants can be onerous, but it is important to persevere.

Equity financing may lead to dilution of the capital but it also strengthens the balance sheet of the company and thereby, its capacity to borrow from banks.

Equity financing basically involves selling shares in the company to external investors: a share in the company is transferred to new owners. As the shares are likely to have voting rights, the original shareowners' control over the company is diluted, and, depending on the amount of equity sold, the new owners may be able to exercise control over the company.

Despite such risks, the advantages of equity financing are by no means negligible:
• Unless there is a provision for a put option, there is usually no direct obligation to repay the shareholders' initial investment. Therefore equity financing can normally be seen as being "interest free". However, as the investment only becomes liquid when the shares are sold, the investor normally requires an exit strategy. A clear plan of how to face an investor's request for a put option or for making the shares more liquid (via flotation) is extremely important and specific coaching may be required in order to avoid unbalanced agreements.
• Dividends to shareholders are decided at the discretion of the company directors unless they are preference shares or there is another agreement among the shareholders;
• Equity investors can provide more than financing: their managerial expertise can be useful for the further development of the company.

Venture capital is a type of risk capital typically provided to new, high-growth businesses.

Venture capital investments are usually high-risk but offer the potential for above-average returns. A venture capital fund is a pooled investment vehicle (often a limited partnership) which primarily invests the financial capital of third-party investors in enterprises that are too risky for the standard capital markets or bank loans.

Table 4.3 indicates the main points to be taken into account when presenting an investment project to venture capitalists.

Table 4.3

Top 10 venture capital investment criteria

Rank	Criteria
1	Ability to satisfy an unmet need
2	The likelihood of an exit
3	The level of motivation and commitment of the founders
4	The potential benefits of the technology or innovation
5	The size of the market opportunity
6	Clarity over IP ownership
7	Level of IP protection
8	An understanding of the need to deliver value to investors
9	An experienced management team
10	Level of commercial awareness

Venture capitalists are typically very selective in deciding what to invest in, with approximately 60% of business plans rejected after a quick scan.

Venture capital is not generally suitable for all stages of companies, with many start-ups choosing self-finance (or "soft finance" from grants or family and friends) until they reach the point where they can credibly approach outside capital providers such as venture capitalists or business angels.

Recently, the number of IP commercialization companies has significantly increased.

In recent years there has been an interesting change in the perception of the value of intellectual property. In particular, in the United Kingdom and the United States, this has led to the establishment of several **IP commercialization companies or accelerators**. Several of these companies have exclusive agreements with one or more universities which give them access to the IP generated by research performed there. Box 4.1 gives an example of how such a company works and shows that money can be made through investments in the early stages.

Box 4.1

Case study: The IP Group (United Kingdom)

Set up in 2001, IP Group is a UK vehicle focused on the commercialization of intellectual property created by partner universities. It listed on the Alternative Investment Market in 2003 and moved to the Official List in June 2006.

The business model of IP Group is based on long-term partnerships with top-tier universities. In each partnership, IP Group offers support for the university's commercialization activities, and in particular expertise in the identification of novel intellectual property with commercial potential, (pre-) seed capital to create spin-off companies, and ongoing strategic, operational, and financial support for the spin-off companies to maximize their chances of success. In return for its contribution, IP Group secures the right to significant interest in the university's spin-offs and technology licenses.

IP Group has signed partnerships agreements, all of which have a duration of 15 to 25 years, with 10 UK universities to date, and has built a portfolio of equity stakes in over 50 companies, 9 of which have been floated with an average cash multiple of 15.

IP Group has proven its business model in difficult market conditions. Its success shows that one can indeed earn money by investing in early stage technologies, as long as the technology procurement process is professionally handled.

Debt financing is another mode of funding for start-ups. It does not incur any ownership, but lenders are not easy to find, as start-ups usually cannot present any guarantee, collateral, or a steady income stream.

The advantage of **debt financing** is that the company gives up no ownership in return for the investment. However lenders that are prepared to consider these early-stage companies will view the proposition as high-risk and require a higher than market-average interest rate. **Venture debt** is commonly used in the United States to leverage equity invested in biotechnology or early-stage companies and normally occurs simultaneously with equity fundraising. Venture debt is less common in Europe. However, within the last few years, owing to a variety of factors, including a poor-performing IPO (initial public offering) market, debt-based venture investing has become a more viable alternative to traditional venture capital investments. A company usually seeks debt either before participating in a round of preferred financing (as a bridge), in conjunction with financing (as a means to stave off further dilution), and / or following equity financing (again to stave off immediate dilution and to create a freer cash flow). The advantages of venture debt are that it:

- extends the cash runway;
- leverages existing equity and intangible assets;
- provides quick access to funding;
- comes at a lower cost than equity;
- is virtually non-dilutive.

3. Funding options

Because providing debt to new and innovative companies requires a specialist risk approach, the normal credit criteria do not apply. Typical criteria include:
• liquidity of 12 month's cash in the business;
• top-tier investors;
• strong management and a sound board of directors;
• multiple market potential or products;
• unencumbered IP.

"Hybrid" financing is a final option. The "mezzanine loan" has some of the advantages of a normal loan and ranks close to equity on the balance sheet.

Mezzanine loans are traditionally offered by a specialized financial institution (called a "mezzanine house"). A mezzanine loan normally does not require guarantees or collateral and involves a lower rate of interest than normal "senior" debt but a much higher roll-up interest at maturity date. The equity element of the loan is normally a set of "warrants" (basically options for equity in the business) to be exercised at maturity. The warrants provide an "equity" return on the financial transaction, which compensates for the high risk involved. The terms and conditions of a mezzanine loan normally include provisions, which allow the lender to take some control of the company in order to safeguard the investment in the event that the company defaults on the loan. At the extreme end of the scale of mezzanine financing are convertibles, whereby debt is provided to the company, but can be converted to equity within a certain timeframe or triggered by certain provisions in the terms and conditions of the convertible.

Table 4.4

Summary of debt financing options

	Debt Corporate	Debt: Leveraged Finance	Mezzanine	Convertible debt	Venture loan
Retention of control	Full	Full	Full (small dilution possible, deal, dependent	Majority subject to conversion rights	Warrants on most transactions
Security	Full	Full	Full subordinated	Partial	Full
Exit time frame	3 - 7 years	7 - 10 years	3 - 5 years	3 - 5 - 7 years	2,5 - 4 years
Impact on cash flows	Bullet or amortizing	Interest and amortization	Interest paid/ rolled up and amortization	Interest followed by dividends post-conversion	Interest paid plus dividends later
Best for	Mature businesses with cashflows	Growth businesses with strong cashflow	Businesses requiring funding that exceeds senior debt level but less dilution than using equity	Businesses with long-term growth plus short-term financing limitations	Businesses with risk too high for conventional debt providers
Provider type	All banks	All banks	Banks, specialist mezzanine providers	Banks, specialist finance providers	Specialist providers
Gearing	Low	Medium	high	Variable	Variable
Cost	Libor + 0,25% 1,25% Rating dependent	Libor + 0,25% 3,25%	Libor + 10% 13%	Variable	n/d

4 Key points

The financing needs of innovative firms evolve from research through to commercialization. A well-functioning, integrated, and dynamic system of financing is crucial for the development of all science parks and technopoles.

The following general comments can be drawn from this chapter's analysis of the different roles and financing requirements of the main stakeholders in the innovation financing process.

General financing requirements

• The funding package for the science park should be global and cover all stages of the project development chain, taking into account the different risk levels of innovative firms;

• The investment plan for parks must be long-term, but must incorporate shorter- to medium-term exit strategies for investors;

• All stakeholders must subscribe to a shared objective of careful management of resources and operate within a culture of cooperation;

• The path to financing is frequently indirect, involving many agents, meaning that regular communication is required;

• Governments can assist through a framework of suitable business and financial law;

• Public sector and development finance institutions often take a lead role in funding science park infrastructure, particularly in the Mediterranean region. The private sector prefers to fund infrastructure and tangible assets for companies;

• At the start-up phase the commercial basics (the business model even more than the technological model) must be well established. This phase is particularly expensive and grants (including technical assistance) are invaluable;

• Equity is the most frequently available type of financing. It involves a loss of control, but can be "interest free". It strengthens the balance sheet and allows for new expertise on the company's board;

• Venture capitalists tend to finance higher-risk proposals and expect higher returns. This is not necessarily suitable for all stages of development (it tends to be preferable later on);

• Debt financing is often difficult to find as it bears the highest risk and may have strict criteria for borrowing. However, the costs tend to be lower than for equity and it is useful to give a company short-term flexibility.

See complementary remarks in Chapter 5, Part A, Section 4.

CHAPTER 5
SUPPORT FOR FIRMS AND PROJECTS

Part A: Individual services

- 1. The role of coaching and mentoring in supporting innovative projects
- 2. Strategic marketing and operational positioning
- 3. Strategic alliance support
- 4. Financial assistance and relations with investors

Part B: Collective services

- 1. Marketing and communication for innovative projects
- 2. Stimulate and support networking and development of collaborative projects
- 3. Business Development (BizDev) actions
- 4. Managing strategic information in an innovative environment and providing business intelligence services

Highlights

This chapter analyzes a number of instruments and tools which can assist decision makers in promoting and implementing innovative projects in science parks and technopoles. These instruments have been considered as good practices, notably within the framework of the European INNOVA program[1] . Some have been implemented through thematic networks such as EBN [European Business and Innovation Center Network].

Managing an innovation project within a science park requires a proper understanding of risks and opportunities. **Coaching or mentoring** can help define the innovation intensity and maturity of the project. It can also help the innovating entrepreneur to assess the risks and properly allocate the required financial resources in order to design an efficient marketing strategy.

For a science park, it is crucial to interact efficiently with all of the project's stakeholders: clients, prospects, partners, experts, public or private investors, other institutions. In certain cases it will be important to emphasize the incremental dimension of the project's innovation or to underline the robustness of (potential) market demand for the new product or process (breakthrough innovation).

As many innovative projects fail, it is crucial to make an adequate evaluation of the risks with regard to the technology, the market, the financing, and the organization. Some points to consider are:

Innovation / technology
Project initiators usually spend a lot of money to protect their innovation, especially by patenting, even though, depending on the level of innovation, there are many alternative intellectual property (IP) protection strategies. Patenting makes information about the innovation available to potential competitors; if a big player then takes a similar patent, the project initiator may not have the funds necessary to protect the IP in court. Therefore, it may be preferable in some cases to adopt a "secret" protection strategy. A coach must show the project initiator that innovation protection is not an end in itself but a means to create a sustainable business.

Market / client
The project initiator must be able to move continuously between the big picture and the details, from the macro to the micro, from strategic vision to operational actions, in order not to underestimate the potential application of the innovation on certain markets and to avoid concentrating on markets with insufficient need for the new product or process.

Financing / investor relations
The coach must show the project initiator that meeting public and private investors' expectations is necessary to raise money for the project and must help him or her to understand their requirements. In particular, investors must be convinced that the project will lead to a real business. This can be achieved by managing market risks from the start.

Team / organization
The coach must help the project initiator to anticipate the needs of the project in terms of human resources, especially by seeking people with complementary skills. It is also of the utmost importance to be able to convince people with a reputation in the relevant domain to join the advisory board of the company in order to gain the confidence of customers and investors.

In a situation of scarce resources, the coach can help the entrepreneur make savings through the optimal allocation of human and financial resources. The coach's experience, expertise and networks can provide the entrepreneur with accurate and relevant information but also with the knowledge necessary to transform this information into priority initiatives and more generally into an action plan.

1 see http://www.europa-innova.org/ index.jsp

The following initiatives on the part of the coach are considered as good practices and attitudes:

- Organizing short meetings with the entrepreneur to evaluate risks and opportunities;
- Stimulating meetings of entrepreneurs to exchange experience on projects, encouraging the sharing of market information and contacts, and fostering technical and commercial partnerships;
- Keeping a certain distance from the project, always reminding the project initiator that the coach's role is limited to the non-technological aspects of the project.

One way for the project initiator to improve the management of the project is to set up partnerships or strategic alliances. A successful methodology for setting up partnerships is shown below.

Definition	Main aspects	Key issues
1. Needs assessment	• Strategic plan • Ideal partner profile – selection criteria	• Clear strategic objectives
2. Partner search	• Identify sources to find partners • Identify appropriate support	• Appropriate sources for partner selections • Choice and involvement of third parties
3. Partner selection	• Compare partner fit to ideal partner profile • Partner's core competencies • Assess complementarity	• Partner fit • Partner criteria • Complementary objectives
4. Negotiation and formation of the partnership	• Identify partnership type • Agree on objectives, activities, deliverables and milestones	• Up-front expectations • Respective contribution • Code of conduct
5. Operating the partnership	• Test progress against agreed targets • Assess new opportunities arising from the partnership	• Expectations met • Flexibility
6. Exit	• Activate collaboration "end game" strategy	• Well-formulated exit strategy in the initial agreement

PART A. INDIVIDUAL SERVICES

This section focuses on the problems of project initiators, entrepreneurs, and related actors, such as private-sector consultants and incubator managers. Project initiators will find methods to help them manage their projects as well as information about coaching and mentoring, as well as supporting structures with appropriate instruments to assess their work.

1 The role of coaching and mentoring in supporting innovative projects

Managing an innovation project requires understanding the risks and opportunities and dealing with marketing, financing, organizational, and technological issues.

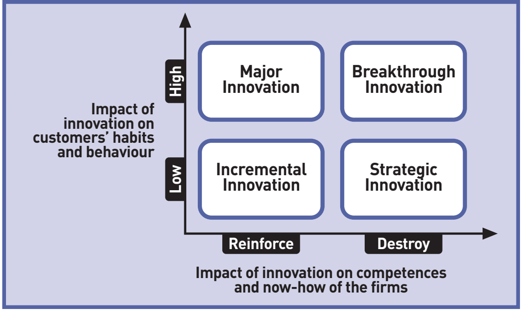
Managing an innovation project within a firm, or forming an enterprise to conduct such a project, requires a proper understanding of the risks and opportunities presented by the project. Market, finance, organizational and technological issues need to be dealt with. A coach[2] can help the project initiator characterize the innovation intensity and maturity of the technology used, assess risks and properly allocate financial resources. This can help the entrepreneur design an efficient marketing strategy.

1.1 Characterizing the level of innovation and including it in the strategy

It is crucial for the entrepreneur to interact efficiently with all stakeholders of the project: clients, prospects, partners, experts, public or private investors and other institutions. In certain cases it will be important to emphasize the incremental dimension of the project's innovation or to underline the robustness of (potential) market demand for the new product or process (breakthrough innovation) (see Figure 5.1).

Figure 5.1

Impact of innovation on customers and competitors



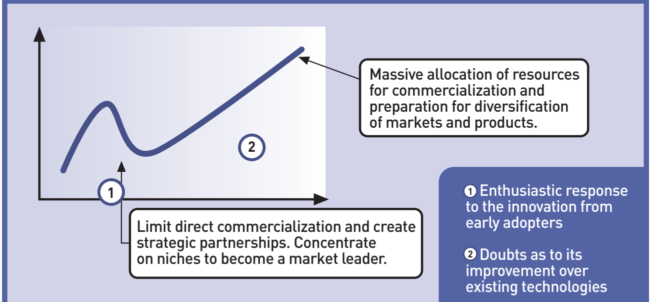
2 Professional coaching helps clients to achieve satisfactory results in their personal and professional lives. Through coaching, clients deepen their learning, improve their performance, and enhance their quality of life. In each meeting, the client chooses the focus of the conversation, and the coach listens and contributes observations and questions. This interaction creates clarity and moves the client into action. Coaching accelerates the client's progress by providing greater focus and awareness of choice. Coaching concentrates on where clients are today and what they are willing to do to get where they want to be tomorrow.
Source: International Coaching Federation – ICF: www.coachfederation.org.

1. The role of coaching and mentoring in supporting innovative projects

It is also important to make the link between the maturity of the technological domain (state of the art, reliability, robustness), and the stage of development of the project, on the one hand, and the strategy for carrying out the project, on the other (see Figure 5.2).

Figure 5.2

Stages of innovation and level of innovation and development strategies



(adapted from the "Hype Cycle" - Gartner group)

1.2 Assessing the risks: technology, market, finance and organization

Innovative projects need to deal carefully with risks relating to the technology, the market, and their financing and organization.

Some of the reasons why innovative projects fail are well known and many studies have been performed on the subject. Some details are given below.

Innovation / technology

There is a risk that the technology may not result in a commercially viable offer, or that the initiator may favor technological performance at the expense of commercial aspects, or that the technology does not create a real and sustainable competitive advantage. Project initiators usually spend heavily on protecting their innovation, especially by patenting. However, depending on the level of innovation, there are numerous alternative IP protection strategies. A patent in fact gives information to potential competitors, and if a big player adopts a similar approach, the project initiator may not be able to afford to prosecute. In some cases secrecy may be preferable. A coach will make clear to the project initiator that innovation protection is not an end in itself but a way to create a sustainable business.

Market / client

There is a risk that the project may fail to convince initial customers and that time to market may be too short or too long. The project initiator must be able to move continuously from the big picture to the details, from the macro to the micro, from the strategic vision to operational actions, in order not to underestimate the innovation's potential on certain markets and to avoid concentrating on markets where the need for the innovation is insufficient. The project initiator should also bear in mind that customers can generate income even at the beginning of the project. If the product does not exist, the promoter should offer services based on its existing core competences and switch to a product strategy once the features meet the customer's real needs.

Figure 5.3

"Macro" to "Micro" From Strategic thinking to effective sales management

Market	Entreprise	Action	
Needs	Answers	Do not lockup ourself in scenarios based on "sensations" instend of validated market information	macro
Key needs	Functions: • function 1 • function 2 • ... • function n	Focus on few scenarios Focus on your core skills and develop the good partnership	↕
Market / Clients	Product	Find the shorter way to markets and sell, then diversify	micro

Three typical major risks:
- The company fails to convince initial customers or there is no real market for the product.
- The company misjudges time to entry: either too early (liability of newness) or too late (saturated market).
- The technological offer creates neither a real competitive advantage nor a clear market position, and/or the company does not anticipate the reponse of its mains competitors.

Financing / investor relations

There is a risk that the company will experience cash-flow difficulties, fail to obtain support from financial institutions, lose this support, or fail to obtain finance within the planned time scale. Revenues and profitability may be overestimated or take longer to achieve than initially planned. A coach must make clear to the project initiator that meeting public and private investors' expectations is necessary to raise money for the project and must help him or her to understand the requirement of these investors. It is most important to convince investors that there is a real business behind the technological offers. This can be achieved by managing market risks first.

Team / organization

There is a risk that the team will not possess the required managerial skills, will have insufficient experience in creating and developing a small company or be overspecialized or lack complementarities. A coach must help the project initiator to anticipate needs in terms of human resources and especially from on the need for people with complementary skills. It is also of the utmost importance to be able to convince people with a reputation in the field to join the advisory board of the company in order to gain the confidence of customers and investors.

1.3 Developing a risk management strategy

The coach can help the entrepreneur estimate the probability that a risk will materialize and assess its potential impact on the project.

In a situation of scarce resources, a coach can help the entrepreneur with making savings through an optimal allocation of human and financial resources. The coach's experience, expertise and networks can provide the entrepreneur with accurate and relevant information and the knowledge necessary to transform such information into priority initiatives and more generally into an action plan.

Once risks and opportunities are identified, risk management strategies make it possible to classify problems and issues by taking account of both the probability of certain risks and their potential impact.

The risks most often observed relate to financing and human resources. First, as outlined above, revenue and profitability may be overestimated or take longer to achieve than initially planned, the company may experience cash-flow difficulties, expected return on investment may be unrealistic, insufficient or take longer to achieve than initially planned; second, the team may lack the required managerial skills or have insufficient experience in creating and developing a small company.

1. The role of coaching and mentoring in supporting innovative projects

In terms of the impact of risks on the project's survival or growth rate, the most serious failings include: failure to convince initial customers or lack of a real market for the product; a business model that is not viable in the short, medium, or long term; cash-flow difficulties; lack of the required managerial skills; an offer which does not correspond to market needs and expectations or would require excessive adjustments.

Once potential risks have been identified and monitored, decisions should be taken to mitigate or eliminate them. The coach should help entrepreneurs estimate potential revenue honestly and provide them with training on strategy, marketing, and business planning. The coach should also encourage the project initiators to concentrate on the risks with the strongest impact. Project initiators need to:

• Analyze the market, perform a strategic and positioning study, identify and interact with future customers (using the technopole and incubator network);
• Define the right business model by collecting information on market players and their behavior and relationships, and analyze potential partners or competitors.

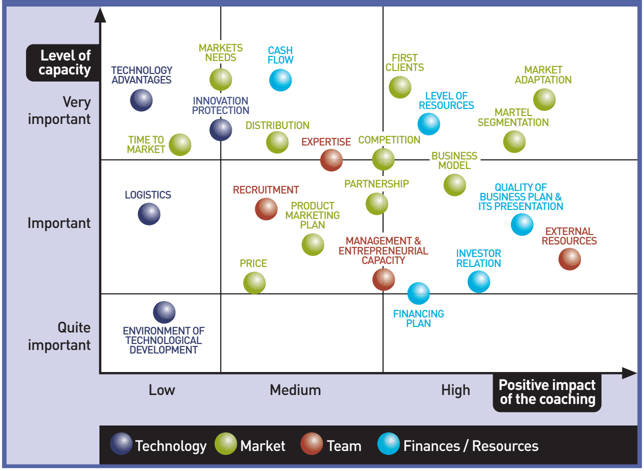
1.4 Enhancing the interface between the project promoters and the coach

A coach should help the entrepreneur on the critical issues in every area (team, technology, market, finance) and can help develop a realistic and convincing business plan. However, the coach should not deal with all the problems the entrepreneur faces.

Project promoters should not expect too much from the support organization. A coach's role is to give continual assistance to the entrepreneurs in reviewing the main issues and to focus on the critical issues (Figure 5.4). The coach cannot – and must not – try to assist the entrepreneur on all issues.

Figure 5.4

Criticism vs. impact of individual and collective coaching



The coach's value added will not be significant for matters such as developing a technological advantage (that is the role of the initiator) or defining the time to market (that is an external factor). The coach can help on issues such as market segmentation or developing a convincing and realistic business plan. Box 5.1 describes experiments in two MEDA countries.

"Soft" coaching is a common practice in large firms for staff under pressure for quick results. Project initiators in such firms often need to express their worries or doubts to independent people.

The following are considered good practices and attitudes on the part of the coach:

• Organizing short meeting with the entrepreneur to evaluate risks and opportunities;
• Stimulating entrepreneurs to meet and share their experience, encouraging sharing of market information and contacts between them, and fostering technical and commercial partnerships;
• Maintaining a certain distance from the project, always reminding the project initiator that the interaction with the coach is limited to the non-technological aspects of the project.

Box 5.1

Coaching experiments in Jordan and Tunisia

Coaching can be offered in very different ways depending on a country's political and economic conditions.

In Jordan, coaching is provided by returnees. This offers society many advantages. Returnees reintegrate into the labor market more quickly. Incubators offer value-added services and can draw on the rich experience of returned entrepreneurs. Project initiators can benefit from appropriate and efficient assistance from skilled professionals.

In Tunisia, intermediaries (technopoles, incubators, investment agencies, industry support agencies, polytechnics) are organized in networks. They can direct project initiators to the support institutions that can accompany the project appropriately.

2 Strategic marketing and operational positioning

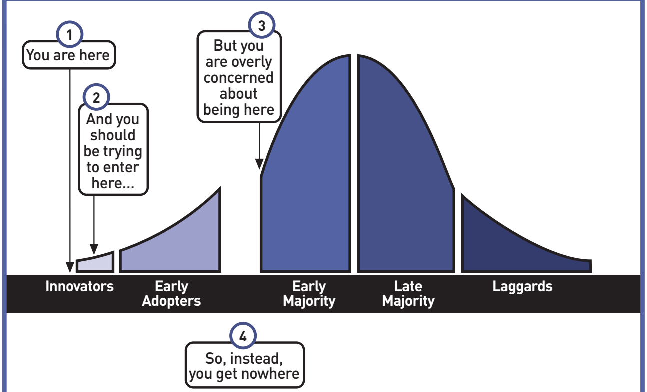
The application potential increases with the novelty of the innovation, but the difficulties for market introduction also increase.

The more innovative a project and the more groundbreaking the innovation, the more noumerus are the possible applications and the greater the application potential. However, the greater the innovation, the stronger the resistance to change, not only among end customers but also potential marketing partners. In this respect, a coach's role is to prepare the project initiator to confront the market.

This interface will change as the project progresses. A coach can make project initiators aware of the dynamics of innovation (see Figure 5.5), and help them to define their positioning and develop a marketing strategy.

Figure 5.5

Product life cycle versus target market



Adapted from Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers by Geoffrey Moore (1991, revised 1999).

2.1 Defining the right positioning

Market needs should be carefully evaluated to maximize the appropriateness of positioning and minimize costs.

To position the project appropriately, it is important to consider several scenarios and to reason in terms of market needs and solutions (current and future) rather than a single scenario (a product / market pair). These should then be broken down into a set of functions to be combined to develop an offer. The next step is to prioritize the targeted market segments on the basis of three variables:
- The intensity of the need in the market segment in question;
- The ability of the technology to meet these needs with a real advantage over existing technologies;
- The ability of the company to meet these needs within an acceptable timeframe.

Once the entrepreneur has completed this task (with the help of the coach), a market survey can be specified and defined (geographic area, price, sensitivity, etc.). The market survey determines the characteristics of the market and market segments targeted (volume, growth rate, leaders, etc.) and of current players, partners and competitors. It does not define the possible business model (see below), the potential turnover (only the overall turnover of a sector/segment) or the costs involved in achieving the potential turnover. Generally speaking, these costs are considerably underestimated, as is the time needed to achieve the turnover, hence the importance of conducting a preliminary positioning study.

2.2 Strategic marketing

In order to define the route to market it is necessary to understand the value chain and the interests and motivations of the players; potential customers should be made aware of the benefits of adopting the innovation.

Innovation suppliers must have a clear picture of the global value chain in their sector of activity (segment), and of their position in this value chain. Once this strategic positioning has been established, it is possible to move to the strategic marketing stage. This involves prioritizing market segments by determining their expectations and examining ways of meeting them (alone or in association with other functions). The result will be a definition of the access routes into the market. The key questions are:

• Who will be my first 5, then 50, then 500 customers?
• Who will be the customers of my customers (use of matrixes such as: needs / markets, etc.)?
• Who are my suppliers and the suppliers of my suppliers?

An innovative project is rarely in touch with the end market. It is therefore crucial to provide marketing partners with sound arguments for end customers. To convince customers, it is necessary to establish user scenarios and to quantify the benefits for end customers. The ratio (benefits of the solution / effort required to integrate the innovation) must be maximized. One way would be to describe a customer in terms of before and after adoption of the innovative solution and quantifying the benefits of adopting.

Assistance can be provided by the private sector with government support. Box 5.2 gives some MEDA examples.

Box 5.2

Strategies and marketing: Mediterranean approaches

In Lebanon, strategic and marketing services are provided by large firms which offer project initiators access to complementary technologies.

In Morocco, coaching is supplied by training services provided by specialized private companies.

In Tunisia, these services are available in technopoles such as El Ghazala within the framework of Medibtikar.

Within Medibtikar, coaching is implemented by specialized teams composed of international consultants and local experts. These services are often financed by national or international programs focused on specific sectors: telecommunications (Tunisia) or well-being and solar energy (Jordan).

2. Strategic marketing and operational positioning

2.3 Defining the business model and analyzing the competition and competitive advantages

The business model should be defined according to the market segments targeted, should take account of competitors and should include a revenue model.

A business model is "the set of mechanisms enabling a company to create value through the value proposition made to its customers and its value architecture (including its internal and external value chains), and to capture this value and turn it into profits" (Lehmann-Ortega and Schoettl, 2005).

The revenue model changes over time, either within a given sector or on the company level. For example, software sales models have changed considerably (from straightforward licensing to "open source" models comprising product supply and services). The same is true in other technological sectors. A company can start by selling an innovative service based on its technology, and subsequently sell the software itself or develop franchises (e.g. sell a telecommunications service or an auditing service for energy costs based on dedicated software and subsequently sell cost-management software packages). The business model is defined on the basis of the market segments targeted. The same product is not sold in the same way, to the same people, nor with the same functionalities to different customers (for example, the personnel departments of a construction company and a bank will have different needs and will therefore look for different functionalities when buying personnel management software).

To define the business model for an innovation in an industrial sector or an emerging, high-growth sector, the following steps must be taken:

• Quantify the benefits for the customer: what specific need does the innovation meet? What is its competitive advantage? An innovation is sold on the basis of its added value, not its development cost.
• Adapt the model according to the maturity of the product and the market: how and in what form should the innovation be sold? For example, sell the result of the innovation or the innovative technology itself as the multiplier effect is greater, or sell a service based on the innovation?
• Identify a lever effect: through which existing or future distribution network can different types of customer be reached?

Competition: Innovative project initiators often say that they do not have any competitors, as they have specific know-how or a technology which they believe no one else possesses. Such statements should be banished, as a competitor is any entity that provides a solution to the same need, regardless of the means. It is better to present oneself as the supplier who can better meet this need thanks to superior technological or non-technological know-how.

To evaluate the competition, a set of matrices should be drawn up to assess the strengths / weaknesses of competing products in terms of their potential to satisfy the target market's needs.

Ideally, competitors should be transformed into partners whenever possible by drawing up agreements enabling all parties to move ahead more quickly and reach the market.

2.4 Operational marketing, choosing the right tools, accurately analyzing costs, using marketing operations as management tools

Operational marketing should start before the product is introduced on the market. It should be tailored to the type of product and its level of innovation; costs should be related to results.

There are three essential criteria for selecting marketing tools:
• The maturity of the project (and of the product or services). Preference should be given to one-on-one meetings at first, followed by mass mailings. In any case, it is always important to start selling before the development process is finished;
• The level of innovation: the more radical the innovation, the greater the lobbying capacity required;
• The type of product: a product worth EUR 150,000 is not sold in the same way as a product worth EUR 30. A cost analysis should be conducted for the product proposed (see Box 5.3).

Box 5.3

A few rules regarding the analysis of marketing costs

What not to do:
Forecast costs without specifying the expected results.
e.g. "We are going to generate a turnover of EUR 500,000 in the first year. To achieve this, we will sell 100 products at EUR 5,000. Our marketing costs will account for 15 to 20% of the turnover and will cover: brochures, stands at trade fairs, TV advertising, website, and the recruitment of a salesperson. Consequently, our marketing costs will be EUR 75,000." This approach, although it may be preferred by accountants, is often inefficient for this type of operation.

What to do:
Model the costs related to a direct sale, a stand at a trade fair or negotiations with a distributor, and model the expected results.
Estimate the turnover per customer, the number of customers, the number of business partners identified, etc. Quantify all the costs of all sales operations by adopting an analytical approach (booklets, brochures, preparation of targeted presentations, stands at trade fairs, travel, telephone, time spent by the team and by the company manager, external service providers, drawing up of the agreement, revision of the agreement, etc.).

There are three stages of a sale or of the finalization of an agreement. These are: identification of prospects, customers and partners; negotiation; finalization of the sale or agreement.

If the company chooses to outsource these functions, the provider will require around 5% for each stage. Part of this (20 to 80%) will be payable in progress and the rest on completion. In this case, the selection and monitoring of the provider must be included in the direct costs.

Important: monitoring marketing and pre-marketing operations enables project initiators to revise their positioning as and when required, and to review their arguments, update their financial forecasts, and adjust their business plan. Consequently, outsourcing marketing operations is extremely risky.

Best practices:
• Do not judge beforehand which product/market pair will enable the company to get off the ground, grow, and develop. Conduct market surveys before making a final decision;
• Select target markets and customers according to market potential but also – and especially at the start – acording to the resources available to penetrate the market and the accessibility of the market.
• Always use a "bottom-up" (rather than a "top-down") analysis approach to link turnover and sales costs;
• Conducting a market survey and defining a business plan will not sell products. What sells products is the right positioning in the value chain, a good strategy for penetrating the market, convincing players (opinion makers and customers), and using the right sales tools at the right time.

Limits: Even with an extremely careful approach, many unknowns remain. Marketing is a "soft" science, and excelling in the field requires pragmatic, imaginative, and charismatic sponsors as well as highly skilled coaches.

3 Strategic alliance support

3.1 Main justification for partnerships

To manage a project, marketing is not enough. The project initiator should also look for partners.

Strategic alliances allow the project initiator to improve the management of the project. A number of analytical results confirm this:
• **Market**: it is easier to access a market with a partner already present in the market
• **Technology**: partners make it possible to share costs and to concentrate on technology development
• **Team**: a partnership provides access to additional contributions (human, technical, etc.)
• **Finance**: a partnership reduces financing needs, but it is important to be ready to share the benefits generated by the partnership. The coach should play an important role in setting up the conditions for efficient partnership.

3.2 Types of partnership

Partnerships may be relatively loose and agreed upon verbally, they may take the form of a contract, or they may lead to the formation of a new company.

Partnerships have been analyzed by many academics and practitioners. In this document, "partnership" is a general term which can be defined by the relation linking the different individuals and businesses engaged in a common project. A partnership can be a relation with a major customer, a distribution company, a supplier of innovation (R&D) or any alliance in pursuit of a common goal (developing a new product, raising finance, etc.) (see Table 5.1). Innovative start-ups wishing to work in partnership with another business / entity will have the following choices:

Table 5.1
Different types of partnerships

RESPONSABILITY DECREASES →
PORTION OF "UPSIDE" DECREASES →
NEED FOR FINANCING DECREASES →

Do it yourself	Pay someone experienced to sell better	Help someone sell for you, by showing them how to sell	Let someone sell for you	Let someone else make it and sell it for you, but own part of that someone	Let someone make and sell it for you	Do nothing
DIRECT EXPORT	AGENTS	FRANCHISING	DISTRIBUTORS (special case : OEM agreement)	JOINT VENTURE	LICENSING	SALE OF TECHNOLOGY
You hire employees to sell.	You have to find the right agent.	You must find the right distributor. He will sell your product or service by prescribed marketing plan.	You sell to distributor, who then resells for a profit. Agreement on the selling price in the foreign market. Private label agreement.	Products and sales are jointly owned by 2 (or more) companies, including one skilled in selling.	The purchasing company (licensee) demonstrates that it has the capacity to add value to the technology and is able to produce the product to meet market demands. The licensee pay royalty. Licensing agreement.	

• To **agree verbally** to work on / develop a project with another party. This may be risky in terms of IP and other protection issues;
• To enter a **contractual partnership** with a research focus or a commercial focus (e.g. joint venture);
• To create a **new limited liability company**: a contractual partnership and the documents necessary to form a company;
• To create a **(full) partnership**.

The types of partnerships for innovative start-ups include:
• The **upstream partnership** (also called technology partnership) which consists of building a better offer for a specified target market. In this type of partnership the two technologies are **potentially partially in competition** but they are also complementary and constitute a global offer;
• The **syndication** (or horizontal partnership) in which two types of services (usually not in competition) work together to meet the same objective: e.g. externalization of operational functions. This can be seen as a form of subcontracting;
• The **downstream partnership** (also called commercial and/or distribution partnership) is defined by a business-to-business relation with the client.

Another option is for innovative start-ups – even at a very early stage – to partner with an organization based abroad. As at the local level, there are many possibilities. The most traditional are presented above. However, when setting up a technological partnership with a foreign organization (business, university) a start-up can use simpler forms of agreements.

3.3. Method for setting up partnerships

To select partners and maximize synergy, it is necessary to apply a rigorous methodology.

Definition	Main aspects	Key issues
1. Needs assessment	• Strategic plan • SWOT analysis • Aims and objectives • Ideal partner profile and selection criteria	• Clear strategic objectives
2. Partner search	• Identify sources to find partners • Identify appropriate support (legal, public sector) • Network • Use of specially designed databases and partner search tools	• Appropriate sources for partner selections • Choice and involvement of third parties • Mode and extent of search • Presence
3. Partner selection	• Identify partner fit against ideal partner profile • Partner's core competences: concentrate on partner's technology, team, objectives, financial and internal capacity • Assess complementarity	• Partner fit • Partner criteria • Complementary objectives • Internal support
4. Negotiation and formation of the partnership	• Identify partnership type • Identify legal and commercial framework • Agree on objectives • Agree on activities, deliverables and milestones • Design new leadership structures • Design knowledge sharing mechanisms	• Up-front expectations • Respective contribution • Agreement to confirm common understanding • Code of conduct
5. Operating the partnership	• Test progress against agreed targets • Review and discuss problems and issues • Record process changes and new IP items • Assess new opportunities arising from the partnership	• Expectations met • Flexibility • Conflict resolution
6. Exit	• Activate collaborative "end game" strategy	• Well formulated exit strategy in the initial agreement

3. Strategic alliance support

3.4 Legal framework for the partnership creation process

It is recommended to formalize partnerships in a contract.

A partnership can exist without any legal agreement. Although many acknowledge that a successful partnership is based on good interpersonal relationships, a legal framework is nonetheless highly recommended. A partnership agreement creates the partnership through a contractual process and identifies the major rights, duties, and obligations of the partners. Partnership agreements are generally drafted on a case-by-case basis and there is no set template, although certain issues are common to all types of partnerships. They include[3]:

- IPR: intellectual property rights;
- Identification of objectives and nature of partnership;
- Role of partners;
- Financial rewards; profit and loss sharing;
- General protection and warranties;
- Confidentiality;
- International agreements;
- Timescales;
- Tax planning;
- Competition and regulatory controls;
- Capital and funding;
- Managing the joint venture;
- Transfer and termination;
- Planning the joint venture;
- Country of Jurisdiction;
- Dismissal of a partner;
- Termination.

3 There are many more points to address when driving a joint venture, such as confidentiality, memorandum of understanding, pre-contract due diligence, accounting issues, valuation issues, consents and clearance, employee issues, definitive legal agreements.

4 Financial assistance and relations with investors

4.1 The main rules governing the financing of innovation (see also Chapter 4)

Instruments to support investors should be tailored to the different stages of the innovation process.

It is important to understand the expectations and constraints of investors (broadly speaking, their need to receive a return on their investments). As innovative projects are risky by nature, a capital investor (venture capitalist) will expect to see a return of 30 to 70% a year over five years. Because the investor takes a risk with the entrepreneur, the cost of the capital is understandably high.

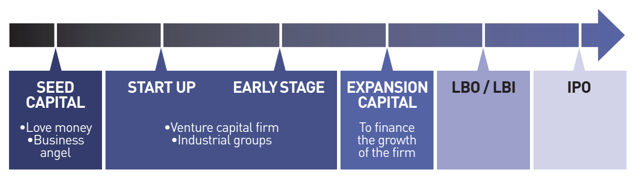
As for public-sector investors that provide subsidies, their objective is to create value from research. They therefore require partnerships with research organizations or universities and ask the project initiator to provide around 50% of the cost of the project. In general, subsidies are small and come with specific constraints in terms of reporting, monitoring, administrative documents, etc.

Approaching a banker during the creation phase is extremely difficult and generally results in failure, unless there is collateral worth around three times the amount of the loan (collateral that has no relation to the project)[4].

Nevertheless, appropriate funding must be available at each stage of the innovation process if the project is to be brought to fruition (see Figure 5.6). At each stage, the role of a coach is to put company managers in touch with potential lenders (according to the project's maturity, financial needs, etc.) and help put proposals together and negotiate.

Figure 5.6

Concise innovation financing chain



A good way to start off a project is to have adequate funding or to convince "family, friends, and fools" to invest. At the same time, a coach should persuade the project initiator to "share" decision-making powers with the investor taking the risk, and, of course, the capital gains and profits generated by the gradual increase in the value of the company and its activities[5].

4 It is also important to know that "corporate" customer service officers in banks receive clear instructions from their managers: sell credit and leasing contracts, and make sure that the customer pays for all services, however small. In any case, they are rarely trained to understand and evaluate corporate objectives, much less company creation projects. **5** The number of incubated projects obtaining start-up funds, and their subsequent growth, could be significantly increased if advisors were able to propose projects meeting these expectations to investors.

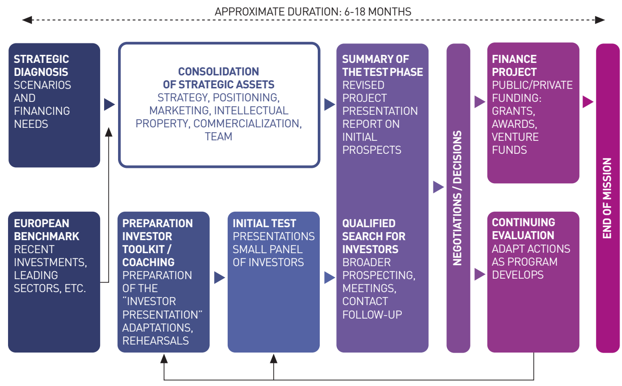
4. Financial assistance and relations with investors

4.2 Fund-raising

Figure 5.7 shows the different steps in the fund-raising process. It is highly recommended to seek expert assistance, especially during the strategic asset consolidation phase. Box 5.4 briefly mentions a few examples.

Figure 5.7

The fund-raising process [source: Synbea, 2006]



Box 5.4

Fund raising: Mediterranean cases

Project engineering and funding instruments are key elements in the development of technopoles and science parks. In Jordan, subsidies for counseling services are financed by international loans, and a new seed fund has been created with government support. In Egypt, Research and Development International (RDI) finances precompetitive collaborative R&D projects (proof of concept) with the support of the EU. In Tunisia and Morocco, venture capital has flourished in the last ten years as European funding institutions have sought partnership opportunities. In Lebanon, Beyritech and entities such as Kafalat provide complementary financing instruments: business angel funds, seed funds, loans, and guaranties.

Access to funds requires special skills and negotiating expertise that go far beyond accounting and planning methods. In Tunisia, obtaining subsidies is generally a long process fraught with uncertainty. Firms are usually not familiar with the necessary procedures but the BFPME is strongly involved in financing enterprise projects and in fostering entrepreneurship awareness. In Jordan, the selection of projects is often achieved through business plan calls for tender. It is also a means of promoting entrepreneurship and assisting SMEs.

4.3 Presentation instruments and toolkit

> In seeking funding, it is important to present the project clearly and concisely and to be informative about needs and expected results.

Investors will assess the project initiator's ability to sell innovative products and services on the basis of his or her ability to "sell" the project to investors.

"You only get one chance to make a good first impression." This means capturing the audience's attention in the first 30 seconds (pitch elevator). To obtain a second meeting, it is necessary to convince the audience in three minutes without using written documents. At the second meeting, the business model, the team and the project's needs in 15 minutes. To obtain financing, one must face an investment committee for two hours. Finally, finalizing an agreement sometimes requires several meetings and the intervention of specialists (lawyers, accountants, etc.).

When preparing the presentation, each of the 16 points depicted in Figure 5.8 should be developed and explained within 5 to 10 slides that will be used depending on the profile of the targeted investor or partner.

Figure 5.8

Presentation model

4. Financial assistance and relations with investors

4.4 Valuing an innovative project

Valuing a project is a job for professionals and needs to be supported by specific legal tools.

A coach should be familiar with and understand the specific techniques for valuing innovative projects, for example:

• Valuation using the discounted cash flow method (a ballpark estimate of pre-tax earnings). The goal is to calculate the current value of the company's future profits;
• Valuation using analogies and multipliers (e.g. telecommunications: number of customers x average revenue per user, price earnings ratio multiplier, turnover multiplier), etc.

Too often, chartered accountants, who generally work with established companies, are brought in to calculate the financial value of a project. They are not necessarily the right people for the job. They often use valuation methods (asset value, etc.) that do not work for innovative companies with no established accounts and/or which are in need of more equity capital. It is therefore usually preferable to seek assistance from a strategy advisor.

Negotiation and associated legal tools
When negotiating, it is important not to focus exclusively on the initial distribution of interests in the company. The following may also be discussed:
• Subsequent steps;
• The limitation of dilution;
• Shares needed to take part in decision making;
• Preferential exit (i.e. the right to sell shares to a third party according to pre-defined terms and conditions), and;
• The non-financial contribution of the investor (participation in operating activities).

There are several legal tools for finalizing an agreement with investors, for example:
• Declaration of intention: This leads to an analysis of the various factors and risks through various due diligences: technology, team, market, financiers, etc;
• Term sheet: This is a short document drawn up on completion of advanced investigations which emphasizes the main aspects of the contract. It serves as a first step before concluding the final agreement;
• Shareholder agreement.

PART B. COLLECTIVE SERVICES

Good positioning will make the funding process more efficient. It depends on the context, the types of partners selected and the objectives pursued.

In this part of the chapter, technopole managers, incubator personnel and center of excellence program administrators will find practical tools to assist firms and institutions that locate in the parks, and local and national policy makers will find instruments for assessing the performance of their support programs.

1 Marketing and communication for innovative projects

1.1 Positioning and the marketing and communication plan of the science park

The purpose of a science park is to act as an incubator, create value from university activities and, more generally, by promoting skills, to create and maintain jobs, revitalize traditional industrial activities, develop emerging activities, and develop the local, regional or national economic fabric.

Many developed and developing countries have already opted to develop innovative environments (especially ICT) in order to boost their economies. The positioning of a start-up company must therefore be clear, specific, and well presented.

The positioning process requires constant balancing between the expectations of players and targets, key skills and know-how, and means of action.

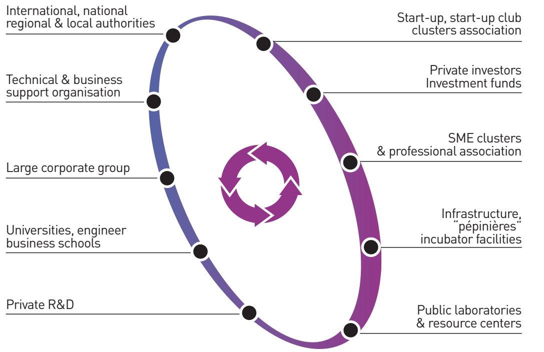
A few essential questions

• What are the objectives? To develop the local fabric? To attract international players? To become an international skills center?
• What is the timeframe: 5 years? 10 years? 15 years?
• What comparative advantages can be emphasized: in terms of skills, know-how, attractiveness, partnerships, individual or collective services provided under what conditions and for whom?
• What part of the value chain is covered?
• What are the expectations of stakeholders? (See Figure 5.9).

Figure 5.9

Some expectations of some stakeholders

The state, public investors: employment, tax and financial independence of the science park.
Foreign public investors: create value from their technologies, access to markets for their SMEs / SMIs.
Local or foreign private investors: profitability of the infrastructures funded, investments in start-ups / SMEs.
Large corporate groups: relocation (lower costs, etc.), suppliers, acquisition of technologies.
Project initiators, start-ups: support for identifying partners and customers and raising funds.
SMEs / SMIs: competitiveness factors, shared infrastructures, etc.
Research centers and universities: create value from intangible assets and human skills.



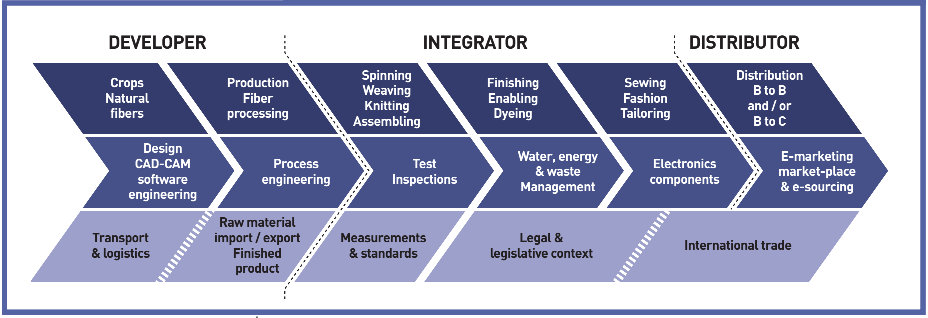
1. Marketing and communication for innovative projects

When these questions have been answered, the project's positioning can be defined and presented.
• It can be summarized in a few lines: the context, the partners and the objectives. It must be clear to all players.
• The positioning should quantify the benefits for each player and give examples of companies satisfied with their location.

Discussions should also be held regarding the selection of value chain segments to target (Figure 5.10 gives an example).

Figure 5.10

Positioning of a science park in the "industrial textile" value chain



1.2 Implementing the communication and marketing policy of the science park

Better positioning will be achieved if partners and customers are properly informed about the project and its environment. This is an objective for the park's communication policy.

The policy has three aspects:

• Provide information on the offer: individual and collective added value infrastructures and services. The aim: **attract members**. A science park provides not only infrastructure but also services; this should be emphasized.
• Provide information on existing members (companies, resource centers) and their offers (innovative solutions, areas of specialty, etc.) for targets inside and outside the science park. The aim: **attract and promote new members**.
• Provide information on trends in a given technological field (e.g. RFID, biotechnology, etc.) or industry (e.g. textile, etc.): covering developments, major events, etc. The aim: **position oneself** as a long-term, essential player in the field on the local, national or international level.

This policy has different priorities and targets depending on the development stage of the technopole or park.

During start-up:

• Targeted information for public and private investors and for national and international players;
• Information on the strategic partnerships established (agreements with large corporate groups, laboratories, innovation networks);
• General information for the public, students, etc., in partnership with the other structures.

During the growth/development phase, it is necessary to:
• **promote widely** the services and benefits provided;
• **coordinate** and bring together regional players to foster "informal" communication and word of mouth;
• **publicize** the success of the companies supported and the research organizations that the innovative environment has helped to build (development of local champions, research contracts, collaborative projects).

During the different phases of the innovation process, the communication policy needs to be linked with initiatives to enhance the innovative environment in the park.

1.3 Choosing the right communication and marketing tools at the right time and for the right targets

The communication skills of directors and project leaders are a key factor. Managers can carry out advertising campaigns, meetings with the local government and the private sector, workshops, brochures, etc.

Once the communication policy has been defined, it is crucial to choose and develop the right communication tools, such as: brochures, website[6], newsletters, road shows, campaigns targeting the general public, targeted advertising operations, individual meetings, etc.

The success of a science park or an incubator will depend heavily on its ability to convince "customers", technical and financial partners, and lenders (Box 5.5 gives some good practices). In this respect, successful communication is contingent upon good lobbying skills – in the "noble" sense of the term – and negotiating ability. Hence the science park and incubator teams must be capable of negotiating both at a very high level and at the grass roots level, and of moving easily from the political to the economic and academic spheres to bring players together around a set of common objectives.

Box 5.5

Examples of good practice

- **Ensure regular communication;**
- **Avoid self-centeredness and self-satisfaction;**
- **Provide information that gives added value;**
- **Foster the development of informal communication channels: word of mouth;**
- **Work in partnership with economic development support structures.**

6 A website is an essential tool (static or dynamic site, intranet or extranet), but there a number of recurrent errors that must be avoided, including:
Error 1: Institutional communication on a public website has a disastrous effect on the prospective clients of the park and especially those of its companies, which are there to make money. A web site is not a good means of keeping lenders informed. Detailed information on the park's operations should not be posted on the web site. Preference should be given to added-value information on market trends, technological developments, project funding opportunities, etc.
Error 2: Advertising a range of individual and collective services that are not yet operational inevitably triggers requests that cannot be satisfied. Word of this then causes lasting disaffection among prospects and discredits the innovative environment.

2 Stimulate and support networking and development of collaborative projects

Within a science park projects will be more innovative if they are supported by various firms and institutions, i.e. implemented by a network. Such collaborative projects often receive government assistance.

It is crucial for intermediaries to provide tenant companies with internal and external networking services. However, informal networking is not sufficient to create long-term relations between economic and scientific actors. That is why innovation intermediaries should:
• First: **enable and support** development of collaborative projects between companies, universities, research centers, corporate groups, SMEs, etc;
• Second: **participate in and set up** collaborative projects with other innovation intermediaries in order continuously to improve value added services for companies, exchange best practices and implement common actions.

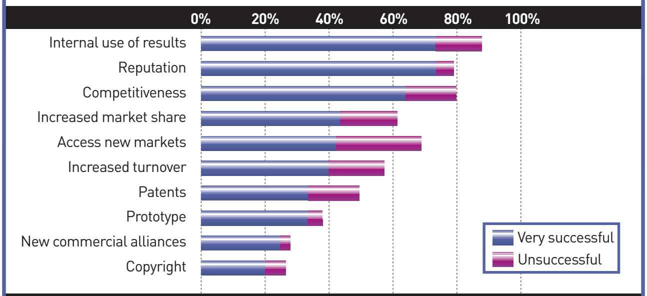
2.1 Benefits of collaborative projects

Participating in collaborative projects can be of interest to various actors:
• **For research centers and laboratories**, it is a way to launch shared international research in order to achieve national and international objectives as well as a vehicle to develop projects with the best international researchers and to anticipate and implement the creation of value from research;
• **For SMEs and start-ups**, collaborative projects provide a basis for developing interactions with potential clients, help limit the financial risks of research and technological transfer, and help promote vertical applications of the technology, network development (technological and commercial partnerships), and enhanced competitiveness;
• **For higher education and intermediary institutions**, partnerships help to establish a common language and methods to support innovation, to promote the regional portfolio at the international level, to benchmark and launch new services, to enhance economic development and to increase the region's competitiveness and its network potential.

Figure 5.11 describes the main motivations and results of collaborative projects.

Figure 5.11

Assessment of EU-supported collaborative projects



Note: Figures refer to the period prior to the launch of the European Commission's FP7. It is important to keep in mind that appropriate identification of the needs and capacities of organizations and a full analysis of financing possibilities and instruments are essential to the success of collaborative projects.

2.2 Coherence of collaborative projects

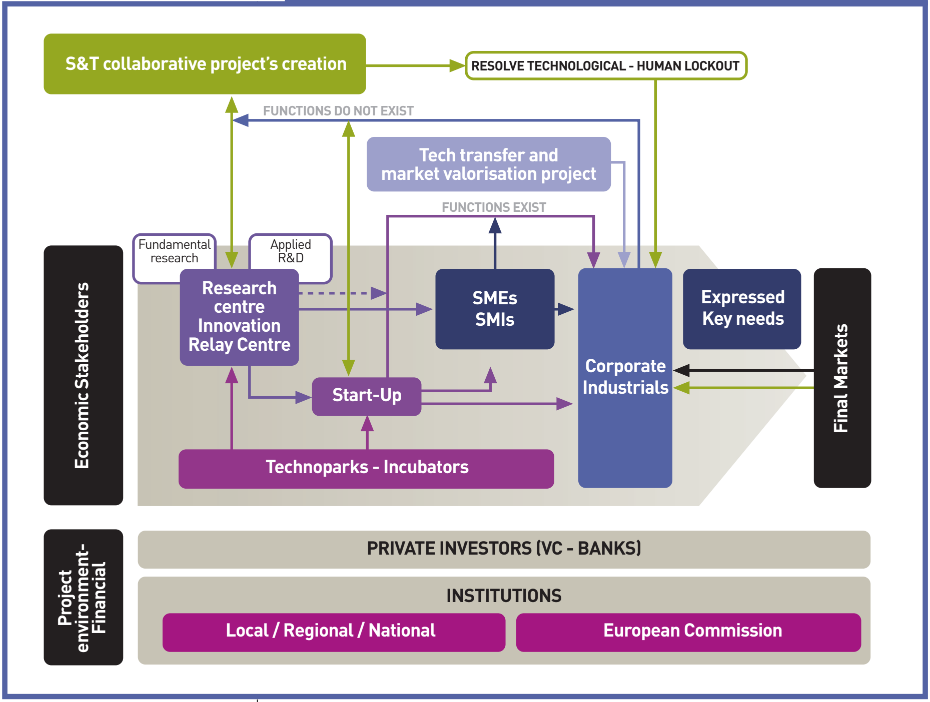
These projects should fit within the different partners' strategies to ensure a good leverage effect.

There are three main stages in setting up a coherent collaborative project and proposition:

Design a development strategy:
Building an efficient development strategy requires an understanding of the value chain, good positioning of the different participating organizations, and an assessment of market needs and financing opportunities (see Figure 5.12).

Figure 5.12

Finding opportunities for collaboration in the value chain



Define opportunities for collaborative projects:

Financing in line with needs and resources:

• Project should be in line with the priorities of selected calls for proposals or programs;
• Selecting financing opportunities in advance is crucial (nearly a year before the start of the project)[7];
• Budget allocation (per line + corresponding subsidy, co-funding and nature) → Evaluate overall project budget and co-financing capacities in advance;
• Evaluation criteria should be used and submission procedures should be followed (paper, electronic, dates, etc.).

7 For EU supported projects, calls are launched only 3-6 months in advance. A permanent monitoring of calls, contacts with NCPs (national contact points), and of budget lines and programs is necessary.

2. Stimulate and support networking and development of collaborative projects

Search for partners:
• Search for appropriate partners, in line with project needs;
• The expertise, resources (including CVs), motivations, possibilities for mobilisation and dissemination, and the interests of each partner should be checked and their precise role defined (coordinator, partners, associates, etc.).

EU-supported projects should be validated by the unit within the technopole in charge of large-scale financing programs and national contact points. This unit can help identify financing which fits the project and assist in the search for partners.

Preparation and submission of the project proposal
(see recommendations in Box 5.6).

Generally each project proposal includes the following:
• List of partners (with e-contacts + information required by the call);
• Deliverables list (outputs/outcomes);
• Milestones and indicators;
• Work package list and description, schedule;
• Summary of efforts in terms of human resources.

Box 5.6

Recommendations for writing good project proposals

• Interact with partners and have them contribute to the proposal;
• The information in the proposal should be precise and clear to an evaluator who is not an expert;
• Demonstrate the project's leverage effect and its sustainability (capacity of the project's activities to continue after the end of international financing);
• Have the proposal read by an outsider;
• Use checklists.

2.3 Role of intermediaries in the preparation of project proposals

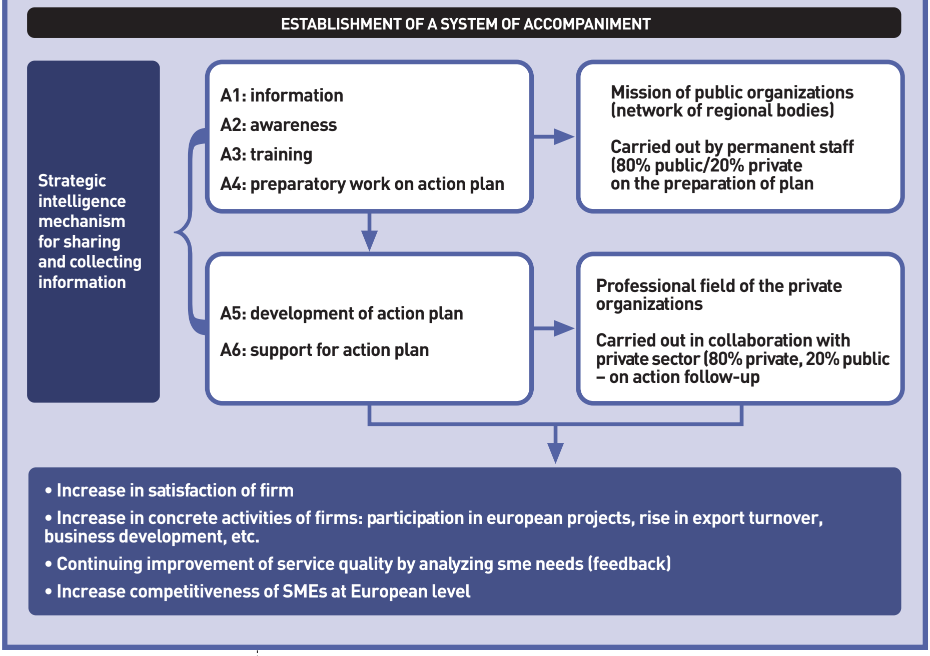
Intermediaries such as consultants can help project initiators identify supporting institutions and gain government support.

In preparing a project proposal, it is important to set up a public-private cooperation scheme. Private consulting organizations are often able to assist companies and intermediary organizations to write a good proposal which can help to get funding. Figure 5.13 shows such a model of public-private cooperation.

Intermediaries should be able to provide project initiators with a list of private organizations able support them. The project initiators of course have to be involved in preparing the proposal.

Figure 5.13

An example of public / private cooperation



Entrepreneurs should be aware of the following best practices while preparing the project.

Do's

- Do make the strategy fit the real needs;
- Do plan well ahead;
- Do share information adequately;
- Do read work programs, calls, guidelines, forms, FAQs;
- Do participate in information days;
- Do validate your ideas: EC, NCP;
- Do get commitment from partners;
- Do prepare abstract, objectives, scope;
- Do make preliminary commitment;
- Do define position of partners;
- Do decide on methods, IPR, evaluation, funds;
- Do consider check lists + numbers + eligibility;
- Do get the proposal (re-)read;
- Do use "lobbying" upfront at level of work program and call definition, and at the validation of the idea.

Don'ts

- Don't seek only subsidies;
- Don't put the whole project into one call if it doesn't fit;
- Don't allow pre-existing partnerships to be the rationale;
- Don't replace the partners;
- Don't bother with useless talk;
- Don't think of the project as "your baby";
- Don't allocate budget before defining activities and no double funding;
- Don't have cosmetic partners;
- Don't have the proposal written only by external consultants;
- Don't simply use cut & paste proposals;
- Don't try to influence selection process, too late & dangerous;
- Don't say that the project is not for commercial purposes when in fact it is.

3 Business Development (BizDev) actions

In MEDA countries, collective action by intermediary organizations is often inefficient because it is insufficiently focused. Individual BizDev initiatives for partnership search and export market validation are more effective, especially when coached by small teams.

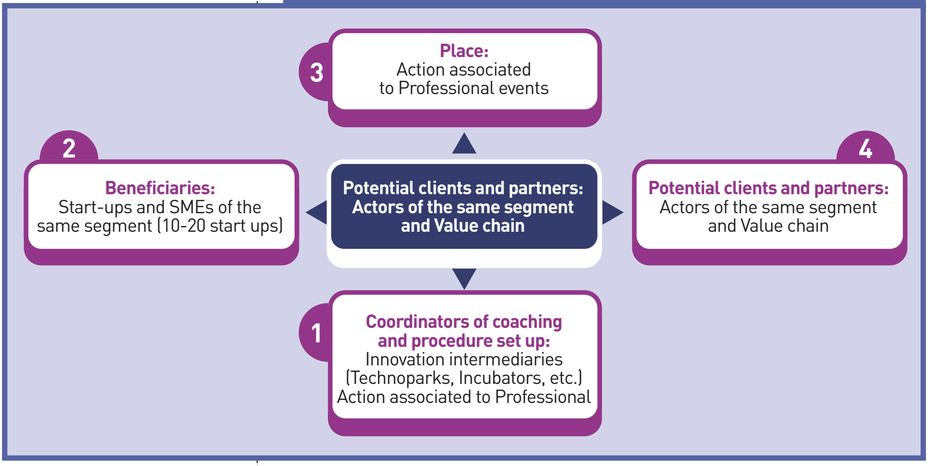
Innovation must travel to become sustainable. Innovative companies and research centers in MEDA often lack access to other MEDA countries. It is usually easier for them to access European markets than their MEDA neighbors. There is no homogeneous "Arab market" for innovative companies.

Therefore, one of the main missions of intermediary organizations is to support the development and commercialization of innovative projects. Traditionally, innovation intermediary organizations propose "collective trade missions" or "matchmaking actions". These "collective" actions are often not very efficient, because they are too general. The preparation and follow-up stages are not well designed and sometimes not even addressed. As a consequence, these collective actions have only a few concrete short-term results. Individual support is much more efficient, but very expensive. Small team coaching for BizDev actions can nevertheless provide quality individual support at a more reasonable price.

3.1 Definition of objectives and benefits of small team BizDev actions

There are two kinds of BizDev actions depending on the objectives (see Figure 5.14):
• Support for matchmaking and partnership search – business development in the sector;
• "Export market" validation – international business development.

Figure 5.14
BizDev goals and actors



As described in Figure 5.14 above, business development actions by small teams are usually organized by innovation intermediary organizations (Box 1 in Figure 5.14) for the benefit of innovative start-ups and SMEs of the same segment (Box 2). These actions are associated with medium- to large-scale professional events (sector salons, forums, international trade, etc. – Box 3) in order to give coached start-ups and SMEs access to other actors from the same value chain segment and enable R&D, technical or commercial, export partnerships and deals (Box 4).

All actors in the "innovation environment" benefit from BizDev support:

Technoparks and incubators will:
• Attract more competitive enterprises;
• Select enterprises with high growth potential (key needs, strategy);
• Gain more visibility (local, regional, national, and international);
• Use new communication tools.

Start-ups will:
• Access efficient networks: new potential clients, new markets, new providers;
• Integrate more research results faster;
• Be more competitive / access information necessary for decision making.

SMEs and SMIs will:
• Integrate technological components from start-ups and access new markets;
• Incorporate new technologies which meet their main needs;
• Generate more business opportunities and have more visibility.

Research centers and innovation centers will:
• Enhance their spin-off policy and process,
• Sell know-how, find complementary competences,
• Achieve more visibility, more technology and know-how transfer and more business.

3.2 Small team coaching – a mix of "individual" and "collective" approaches

Small team coaching provides training, consolidated prospecting, and monitoring of relations as well as market information and analysis.

To be efficient, small team activities should be well prepared. There are two main stages – the individual stage (sector analysis, start-up selection, and individual profiling of partners / clients for each start-up) and the small team stage (prospecting, consolidation, coaching, follow-up, etc.). Innovation intermediaries can be supported by a sectoral expert at the individual stage or at both individual and small team stage.

3.3 Taking stock of information and contacts

This information often emerges when BizDev events (partnerships, business meetings) are organized.

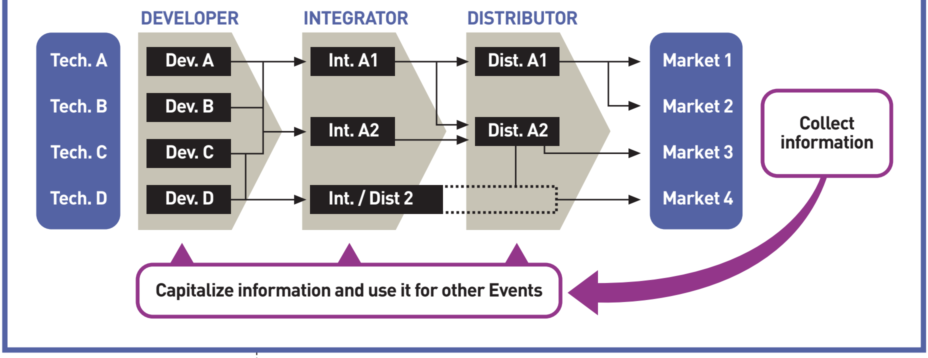
One of the keys of BizDev's success is information structuring and building of a knowledge platform (see Box 5.7). It is therefore crucial to collect information before, during and after an event (see Figure 5.15) about:
• Start-ups' profiles and prospecting lists;
• Potential clients and partners (names and contacts);
• Markets;
• Initiatives (follow-up reports, etc.).

Information gathering helps to organize future BizDev events and to make them more efficient for beneficiaries. Different kinds of tools can be used to collect, capitalize, and share BizDev information.

3. BizDev actions

Figure 5.15

BizDev action and capitalization of information



Box 5.7

Prerequisites for efficient BizDev actions

- Using a market-oriented shared information platform focused on market needs;
- Allowing a common view by the business developers of the market characteristics and of the major needs;
- Accessing outside expertise on the selected value chain and sharing of business contacts;
- Identifying a technology offer to meet key needs and detect business opportunities;
- Linking start-ups to their end markets, facilitating the start-up selection process;
- Sharing market experience within the network;
- Supporting key processes: communication and promotion of the network, enhancement of networking and cooperation projects, business development and matchmaking activities, monitoring the network.

4 Managing strategic information in an innovative environment and providing business intelligence services

Dynamic data management systems are critical for innovators, because they help them to identify useful information and anticipate the future. Intermediaries are important because they can exchange crucial data with innovators.

Strategic intelligence, business intelligence, and data collection, diffusion and transmission are complex and expensive; the return on investment is difficult to prove and measure. There are, however, network-based strategic information management models. This section provides some information on these models with a focus on:
• The presentation of integrated strategic intelligence models applicable at the level of the MEDA innovation system, a science park or one of its components (implementation principles and their limits);
• The links between a joint strategic intelligence system (offensive or defensive), the development of an action plan (use of data to identify opportunities or threats) and support for action (seizing opportunities and overcoming off threats).

4.1 Information and innovation: the problem facing innovators

There is an abundance of information nowadays thanks to the Internet. Paradoxically, however, it is becoming more and more difficult to find information at the right time and to quantify it once found. **For innovators, who often have to start their projects single-handedly, managing data in a structured manner is very costly**. This is true of all processes involved in setting up a structured and efficient data management system: collection, processing, dissemination, and use.

However, without a permanent, dynamic data management system, innovators run the risk of:
• **not being truly innovative**, or "reinventing the wheel";
• **being left behind by competitors**, and not realizing that a series of incremental innovations can undermine the ground-breaking innovation they will generate in the longer term;
• **redeveloping functions which already exist** and which could be developed by a partner company, instead of concentrating on their core skills.

The data exists but is disseminated and fragmented, and the innovator's "area of contact" with the various environments is small. The development of partnerships will put innovators in a stronger position.

To cut costs, innovators must be able to "share" data and set up a sort of "joint" data intelligence system.

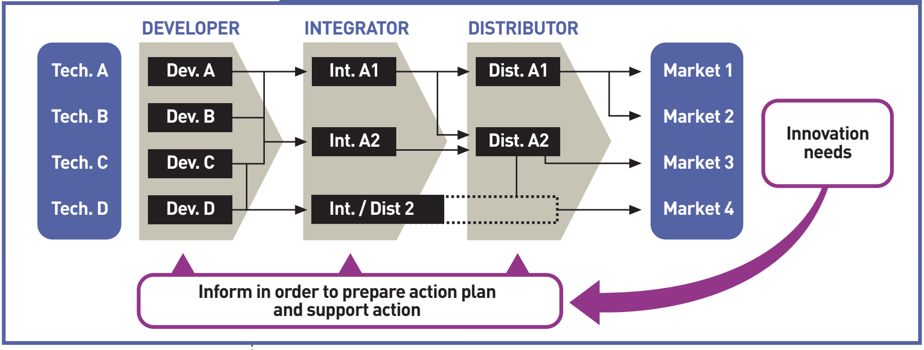
In this respect, **intermediaries play a crucial role. Innovation intermediaries (sector-based support centers, incubators, and science parks) have the data that start-ups and SMEs need**. They act as "information hubs". They must therefore **design, coordinate, and operate intelligence systems** so that the different actors can exchange data in the general interest and in their own interest.

The data needed to innovate effectively stems from several environments (see Figure 5.16):
• The **market** environment: SMEs and SMIs, large corporate groups, and end users. Even though the innovator is rarely in touch with end users, it is essential to understand their needs in order to be able to communicate with partners.
• The **financial** environment: capital and public investors. The simple fact of knowing where investments are going, which projects have been financed and when, enables innovators to know if they are in step with new developments and trends.
• The **scientific and technological** environment: laboratories, research centers and universities.
• The **institutional** environment: chambers of commerce, sector associations, incubators, and science parks. The data provided by these organizations is of capital importance to the innovator, whether it relates to a specific sector, the administrative and legal environment, or available aid.

4. Managing strategic information in an innovative environment and providing business intelligence services

Figure 5.16

Model of a value chain for the quick identification of players, needs, offers, markets, and technological developments and trends



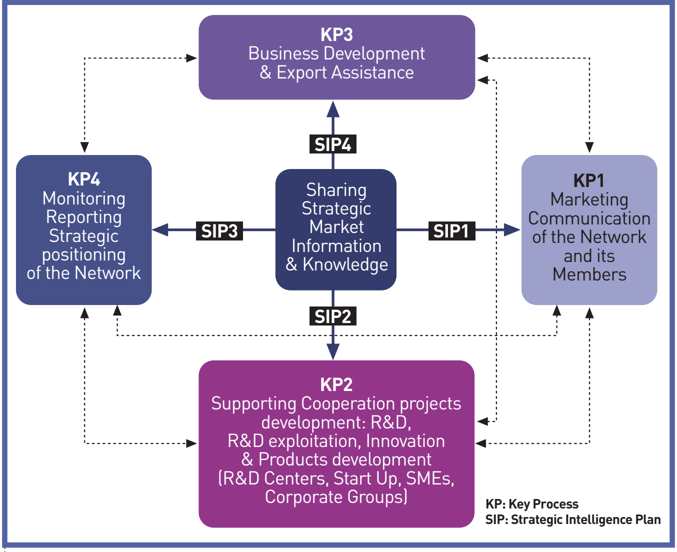
4.2. Using data

A strategic intelligence initiative can be organized in science parks to focus on a value chain, a technological or scientific field, or joint projects or business development opportunities.

Internal use or indirect use by innovation intermediaries: data can be used to support or improve key processes in the innovative environment and the joint services provided (see Figure 5.17).

Figure 5.17

Economic and strategic intelligence as a basis for key processes in poles of competitiveness, clusters and networks



SIP1: A strategic intelligence initiative covering **the players** in a value chain, a **specific technological or scientific field, market requirements** or the segments in the value chain will facilitate:
• The definition of a rational positioning for the science park and its members in relation to competing or complementary science parks and the effective promotion of this positioning;
• The implementation of prospecting and recruitment actions in under-represented segments.

SIP2: A strategic intelligence initiative covering **joint project opportunities (international lenders, ministries, etc.)** will facilitate:
• Formal cooperation programs between players inside and outside the science park;
• The drawing up of financial aid applications for members of the science park;
• The building of partnerships between complementary science parks (implementation of new services).

SIP3: A strategic intelligence initiative covering **business development opportunities** (trade fairs, etc.), and the **capitalization of data** after export support operations will:
• Give science park players access to data on their customers' and partners' needs;
• Optimize "export" operations, by targeting supported members and interesting contacts;
• Put prospects, customers and potential partners in touch with members of the science park, before and after business development operations.

SIP4: The **data derived from SIPS 1 to 3** can be used not only to **improve the science park's services** but also re-used to **monitor and report** on the innovative environment to the **supervisory institution** (ministry, government, etc.) which can use the consolidated data to **update its innovation support policy**.

The results of the strategic intelligence plans can also be made available for "external" or direct use through the deployment of intelligence services to the companies and players in the science park. If the data has added value, it could become **a service paid for by members of the science park and the external environment**.

4.3 Setting up an intelligence system

A strategic data-sharing system can be built using the strategic intelligence plans. It can operate within the science park and for the innovation intermediary network in the whole Euro-Mediterranean region.

A network-based strategic data-sharing system can be defined as a sum of strategic intelligence plans that brings together a group of players (contributors and beneficiaries) around common innovation problems.

• The definition of strategic intelligence plans (SIP 1-3) takes into account the fact that the data may be used by several players on several levels, at various times.
• The plans must be designed in such a way that beneficiaries want to contribute to the data collected and become active and regular contributors (companies, research centers, technical centers).
• It must be possible to extend these strategic intelligence plans with individual intelligence plans (IIPs) for a specific group of players, a specific scientific topic, or a specific market. The data produced by the IIP should be re-usable.
• The data must be accessible to players involved in the intelligence system, for their direct or indirect use. This requires an IT system which can disseminate data in a targeted manner.
• Strategic intelligence systems must be linked to the services offered by the science park. For example, it is pointless to identify joint project opportunities if no help is provided for using the information, e.g. in drawing up a project proposal for submission to a lender (SIP2).

4 Annex

Understanding the partnership creation process and checking the strategic motivation of the entrepreneur.

A coach should help the project promoter to weigh up the advantages and drawbacks of partnerships. The SWOT analysis below is targeted at partnerships within innovative start-up.

STRENGTHS
A partnership with the right partner at the right time can ensure:
• Faster growth and a more adaptable structure;
• Faster market penetration and a stronger offer.

WEAKNESSES
• Time-consuming;
• Requires more resources (financial, people and skills);
• Can be essential but bears many risks factors (see threats).

OPPORTUNITIES
• Increase capital;
• Access new technology and expertise;
• Develop new and existing products;
• Access manufacturing sites and know-how;
• Marketing and distribution;
• Increase market share / access new markets.

THREATS
• Financial impact badly calculated;
• Lack of exit strategy;
• Misuse of lawyers, too much or not enough;
• Lack of planning, objectives and timescales;
• Problems of communication / negotiation.

Strategic motive	Exploitation	Exploration
Risk/cost sharing (TCE)	• Reduce total risk and cost • Rationalize and thus reduce costs through economies of scale	• Enable faster market entry and exploration • Enable product diversification into attractive yet unfamiliar business areas and thus reduce market risks
Transfer of knowledge-related capabilities (TCE and OL)	• Focus on matching existing (explicit) skills and resources (compatibility) • Focus on needed skills and resources	• Focus on collaborative utilization of skills and resources • Focus on creating new capabilities by fusing skills and resources
Shaping competition (SP)	• Create defensive ploy to reduce competition • Create offensive strategy to increase competition	• Undertake co-competition to generate new value
Market access (SP)	• Conform to host government policies and regulations • Exploit local market knowledge • Exploit distribution channels	• Redesign and integrate all relevant aspects of the value chain in order to maximize strategic flexibility
Facilitate internationalization (OL and SP)	• Increase international experience • Speed up international market entry	• Develop global strategy • Develop global organization • Internationalize value chain
Strategic linkages (TCE and RD)	• Undertake vertical quasi-integration with each partner contributing one or more elements to the production and distribution chain	• Fully integrate relevant knowledge-related capabilities and resources throughout the value chain
Gaining legitimacy (PE and IT)	• Achieve homogeneity through competitive and institutional isomorphism	• Achieve heterogeneity and autonomy though isolation and independence

TCE: transaction cost economics; **OL:** organization learning; **SP:** strategic positioning; **RD:** resources dependency; **PE:** population ecology; **IT:** institutional theory

ANNEX

- 1. Different approaches to technopoles and science parks
- 2. Connecting the technopoles and the power of networking
- 3. Challenges and main features of the financial sector in the Mediterranean countries

1 Different approaches to technopoles and science parks

A first wave of publicly supported technopoles emerged in the 1970s, with ambitious targets and correspondingly large sites and interventions. The Research Triangle in North Carolina and Sophia Antipolis in France are the best-known examples of this type. Their success and image triggered a new wave of more moderate adaptations to the model, tailored to the size of the regions adopting them. Thus, a wide variety of sites emerged from the 1980s, ranging from full-scale technopoles to more moderate science parks linked to regional universities or research centers, down to small incubators that take the name science or technology park. Ample funding, offered since the late 1980s in the European Union as regional development aid to less favored regions, was used to create science and technology parks in all southern European countries. The International Science Parks Association now counts approximately 200 parks in 47 countries and many national associations are formed in an effort to lobby national governments in the interests of members and to support these members in finding more effective means of management.

The successful high-technology cluster phenomenon originated in the **United States**. While technology clusters have often been market-driven, the rationale behind the establishment of parks was the need to overcome the collapse of the traditional sector approach. The US experience is characterized by minimal federal intervention and a park-like environment, which includes both research and manufacturing activities. Following this initial success, many states and local authorities decided to promote high-technology clusters. Their variety makes it difficult to describe them in detail, yet important lessons for policy makers can be drawn from the Research Triangle, described in Box 1.

Box 1

The Research Triangle Park, North Caroline, USA

When the Research Triangle Park was conceived, its architects consciously sought branch facilities of Fortune 500 and major foreign corporations rather than headquarters or new ventures. The strategy made sense in the late 1950s: the region's economy was dominated by large tobacco, textile, and apparel manufacturing companies that were not locally owned, and there was virtually no tradition of entrepreneurship. The region's three research universities were strong but generally not at the forefront of science and technology. Neither the government nor private investors were ready to invest in local start-ups, and major corporations were not ready to move lock, stock, and barrel to the South. So, the Triangle grew its early high-technology economy around branches of such corporate giants as IBM, Mitsubishi, and Harris Semiconductor, along with several strategically located government labs. It contrasted with the high-technology start-ups that were sprouting near Stanford University and San Jose, in California, and in Boston, Massachusetts, near Harvard and MIT.

The Boston and Silicon Valleys are still going strong, and the Triangle has broken out of its branch office mold to become one of the nation's most dynamic locations. Today, we hear the names of such start-ups as Red Hat, SAS, SciQuest, and Quintiles as often as such Triangle branch offices as IBM, Nortel Networks, and Cisco Systems. Between 1994 and 1998, North Carolina's Durham, Orange and Wake counties hatched more than 13,000 enterprises and almost 200,000 new jobs. That includes not only new fast-food and retail franchises, but also many high-tech companies. In fact, this transformation is occurring because of the branch office strategy of the 1960s, 1970s and 1980s, not in spite of it. Corporate branch offices helped legitimize this part of the South as a major business venue. What was good for Big Blue was good for many other companies. Branch offices tended not to be cookie-cutter production facilities but high-end R&D operations, and in some cases, research and / or regional headquarters that employed a high percentage of engineers and scientists with advanced degrees, many imported from outside the region.

...

Research Triangle Park thrived, in part, because professionals were willing to move to the area for the quality of life. Top engineers and scientists formed such strong attachments that when their companies were acquired, forced to restructure, or even to close in North Carolina, many chose to stay, sometimes using their severance pay, pensions, and personal savings to launch new enterprises.

At the same time, the region's research universities grew in national stature, especially in medicine, biotechnology, materials science, computer science, and chemical engineering. The greater pool of talent, combined with efforts to develop and commercialize technology, has led to a steady increase in intellectual property emanating from the universities. Personnel at UNC-Chapel Hill filed 116 invention disclosures in fiscal year 1999 and entered 70 new licensing agreements, generating USD 1.7 million in income. UNC researchers applied for 74 patents and obtained 41, bringing UNC's total to 261. Figures for North Carolina State University (NCSU) and Duke University are comparable.

Many of the best-known local start-ups have a university connection. Their success has captured the attention of the venture capital community and has encouraged private investors and such local organizations as NCSU, the N.C. Biotechnology Centre, and the N.C. Technological Development Authority to create equity funds for new start-ups. California and Boston-area capitalists have also discovered the Triangle as a place to invest. As this region initially lacked enough activity to create a risk-taking culture, high-technology branch offices were a necessary stepping-stone to the region's current more dynamic stage.

Source: Largely based on Michael Luger, The News&Observer, August 27, 2000.

Science parks, the term most commonly used in the **United Kingdom**, spread through the country following the pioneering Cambridge phenomenon of 1971[1]. In the 1980s the growth in parks was contagious, and very few traditional universities were not involved in the establishment of a science park. With the advent of deep structural changes in the British economy during the 1980s, the notion that high technology contributes to wealth creation gained support and local authorities began to consider science park development as a vehicle for attracting high-technology firms. This changing perception was coupled with the central government's decision to reduce state support for the higher education sector. Thus by the mid-1980s, the science park movement had gained momentum and parks had become property-based initiatives with a formal link to a higher education institution (HEI) and designed to encourage high-technology business development. Their management was actively engaged in technology transfer, since the evidence suggested that parks could be poles of growth and contribute to the modernization of existing industries. The central government was happy to endorse science parks, but had no need for actual involvement beyond the activities of its property investment agencies. Then, in the mid-1990s, the science park movement reached a plateau.

In many of the country's economically depressed areas, ideas for science parks came from the public sector rather than universities. Physical proximity was considered crucial. A science park was sometimes a single building, even a re-furbished factory, with tenants engaged in high technology. In general, however, results have been more satisfactory in urban areas. Cambridge is considered a major success story, with a development site at the edge of the town; the science angle was a means of gaining planning permission and differentiating the site. The Manchester Science Park was more successful in technology support due to its proximity to three universities.

In contrast to the United States and the United Kingdom, the movement in **Japan** was driven by national policy. The main objectives of the "Technopolis Program" of the Japanese government, implemented in the mid-1980s, were the introduction of technology into all sectors of the national economy and the reduction of the disparities between individual parts of the country. It is the archetypical case of a "technopolitan" movement with national and not just regional ambitions. From the point of view of the national economy, the growth

1 See Segal, Quince, and Wicksteed, The Cambridge Phenomenon Revisited, 2000.

of existing technology-intensive industries is the goal of this instrument of technology policy. From a regional policy standpoint, the objective is to make lagging rural regions more attractive and thus to reduce economic and regional disparities. The Japanese government created one of the most ambitious technology-policy programs worldwide in order to achieve regional and national aims at the same time. In this context 26 technopolis sites have been developed, mainly in peripheral areas. In order to be recognized as a "technopolis", the region must satisfy a multitude of prerequisites with respect to its economy, population, and infrastructure. The instruments used are the establishment of high-technology industries, the foundation or relocation of research institutions, and the availability of attractive living conditions for employees. Specific milestones, in terms of number of enterprises, employment, population and gross value added, were set for each technopole. In terms of policy, the Japanese experiment, described in Box 2, provides an example of a comprehensive initiative and ambitions initiatives with appropriate means.

Box 2

Technopoles as a regional development concept in Japan

The technopolis concept was defined by law in 1983 and aimed at accelerating regional development based on high–technology industrial complexes in designated regions. Through a range of financial incentives, the law promoted the relocation of advanced technology firms to communities with pleasant environments.

As initially conceived, the technopolis strategy was to develop relatively lagging regions by creating towns in which industry (especially electronics, bioindustry and materials), technology-oriented academia, and residential space would be closely related. Early plans proposed the construction of several new model towns, each with a population of ca. 50 000 for an area of some 2,000 hectares. Partly as a result of strong interest among municipalities throughout Japan, the plans were modified to enable the development of existing facilities and potential.

Support functions, intended to promote the improvement of regional technology and the development of new products, have been provided in every technopolis region and "brains-of-industry" region. A range of investment incentives was made available to enterprises in the form of tax allowances (special depreciation on buildings and machinery, exemption or reduction of local taxes) and subsidies, primarily through low-interest or interest-free loans.

France can be considered as a mixed model, which falls between those of the United Kingdom and Japan. The origin of the French policy is the world reputation of the Sophia Antipolis technology park, a big and ambitious undertaking which imitated US successes, but with strong elements of public intervention. French state-region contracts encompass the creation and promotion of technology centers, which are representative of science-based industrial activity at the regional scale, in addition to research activity, higher education, and other factors necessary for technopoles. In France there has been a movement towards the creation both of bigger technopoles, with ambitious regional targets and central-regional government co-operation, but also smaller, university-based initiatives.

In most of the smaller, industrially competitive European Union member states, but also in many cases in the United Kingdom and Germany, one typically finds medium-sized parks, with 10,000–20,000 square meters of space, with one or more HEIs involved, and more emphasis on spin-offs and endogenous development than on manufacturing and attraction of inward investment. In **Denmark**, two of the older and larger parks, Symbion and Aarhus, are particularly successful with more than 50 companies on each site, an emphasis on specific technologies, and well-organized support for networking and finance. Similarly in **The Netherlands**, small local universities tend to favor the creation of parks associated with the university and spin-offs, with consideration given to empowering the local economy, rather than the attraction of foreign direct investment.

Twente and Groeningen are among the best performers and are cited as models for similar undertakings. In **Germany**, national technology policy has never directly favored a "technopolitan" movement. There is a very high number of business incubators, with sound management and strict criteria, at the local, rather than national or regional, level. Specific initiatives at the *Land* level emerged in Bremen, with emphasis on the attraction of bigger German investors, such as Siemens. Finally, in **Australia**, technology parks tend to follow the UK model, with policy makers are well aware of the need to promote technology transfer (see Box 3).

Box 3

The Western Australian Technology Park

A survey of the results of the Western Australian Technology Park (WATP) has shown that significant interaction takes place both within WATP and between WATP occupants and Curtin University. While there is less interaction than for a comparable park in Surrey, a disaggregated analysis which takes into account inter-company interaction (and reflecting a network rather than a linear view of innovation) reveals that most companies are not "islands" but interact with others in close geographical proximity and find this interaction to be important. Specific policy suggestions, such as permitting manufacturing, having a more active park management, and de-emphasizing one-dimensional technology transfer mechanisms (i.e. from university researchers to park-based companies) have been taken up and seem to be having positive effects at WATP.

This does not mean, of course, that the situation cannot be improved. The survey revealed that about half of WATP companies had been assisted by park management, and quite a few also indicated that they wanted more opportunities to meet and interact with other park companies. A small but significant number had moved to WATP expecting interaction with the university and other park companies, but had not yet had these expectations realized.

One suggestion has been to urge a more active role for larger firms in WATP interaction. The ability of bigger, internationally successful companies to assist smaller companies is well known, but analysis has shown that the larger companies in WATP were not especially strong local networkers. Encouraging these companies to share their expertise, knowledge and contacts would be very useful for the further promotion of information networks and productive interaction centers around WATP.

See Phillimore, Altham and Coggin, "Innovation in Isolation? An Evaluation of Western Australian Technology Park."

Southern Europe offers a very different situation, as practically no parks were established until the mid-1980s. At that time a major shift in regional development policies took place with the deepening of the European integration process. Regional funding was substantially increased and new aspirations focused on technology policy. In the creation of science and technology parks, Southern Italy, Spain, Portugal, and Greece saw a promising instrument and an opportunity to absorb rapidly European funds, facilitate industrial diversification, and enhance regional development. The academic system was an interested actor willing to play the role of the promoter of the parks. Thus, in the late 1980s and early 1990s, all of these countries saw the establishment of parks (two in Portugal, four in Greece, twelve in Southern Italy and more than a dozen in Spain), all of them supported nationally, with local universities or research centers playing a champion's role and all of them EU co-funded. The targets have been mixed, including inward investment and local economy upgrade through technology transfer and spin-offs. In many cases the targets were more ambitious than regional development contexts warranted. Two of the factors contributing to their failure have been identified as undully easy finance and unsuitable management structures.

2 Connecting the technopoles and the power of networking

2.1 Introduction

Networks are characterized by geographically dispersed communities of practice with common interests, shared needs, and participants with a similar identity. The sum of the parts benefits the whole network. Network members have functions within the group, and the flow of communication between communities of peers contributes to synergy and achieving best practice.

Innovation is a function of changes in technology, organization and social practice, and the pace of knowledge exchange and uptake of new ideas and technologies are extremely important. Because networks facilitate speedy dissemination, they are helpful to innovation. Innovation networks are communities of technological practices: they support organizational learning, and they allow for increased specialization and the combination of resources. Such networks act as "innovation thought collectives" and can facilitate the paradigm shifts which are important for innovation uptake and disruptive technologies.

Networks usually organize information exchange mechanisms: meetings, conferences, training, access to experts, websites, databases, and newsletters. They stimulate activities such as technology transfer and access to clients or finance across geographic boundaries. They establish benchmarks of best practice, against which members can rate their performance against their local or international peers. They support professionalization of organizations and individuals within their sphere of interest. The networks themselves become learning organizations which promulgate good practice.

Networks vary greatly in scope: geographic reach, thematic focus, size, and organization. They may include: an industrial cluster with a shared technology or market; a group of innovation players from one region or country; and an international network of science park; or special service providers. Networks relevant to technopoles usually have specialized interests: a technology, such as optics or bio-technology, or a special interest, such as sources of finance (for example the European Private Equity and Venture Capital Association (EVCA)).

Establishing a new network involves: formalizing relationships and developing financial models to pay for services, establishment of management structures, and formalizing procedures for service delivery. Sometimes networks are formed with public support, and members join the network by responding to calls for proposals, which are evaluated by the organizing public authority. Joining a network usually involves paying a membership fee and satisfying specific selection criteria.

Several checklists, linked to establishing and joining networks are provided below. It should be noted that technopoles participate in networks in different ways: the level of participation is determined by the organization's strategic intent and the resources it can contribute as a network member. This includes the important resource of human participation.

2.2 The origins of networks

Networks emerge in different ways. They may arise organically or from a top-down policy stimulus. Organically emerging networks are those that evolve naturally from a perceived common need among a group of players. They may be companies in industry clusters coming together to agree standards, or organizations in an innovation park coming together to identify common service needs. A network that emerges from a top-down policy initiative is one for which a perceived "gap" exists. Policy-setting organizations allocate resources to provide support, through a network, to fill this gap.

It is important to know how networks emerge, since their origin has a fundamental impact on their ownership and governance, and on how they function and grow.

When networks form **spontaneously** it is usually around a common interest. When companies share a common location, or interact in a supply chain, they often cooperate on shared issues, and networks emerge rapidly. Inside technopoles and science parks, companies often come together and form **local networks** to promote their interests. **Industry clusters** frequently emerge when large corporations are surrounded by subcontractors and/or component suppliers. Clusters can also go beyond regional and national boundaries. International industries, which require large investments and high-technology rigor, give rise to networks of clusters across borders. International cooperation among networks of clusters becomes increasingly important in a global economy, especially when industries compete for limited resources, including access to expert knowledge. **Supra-national clusters** are found, for example, in the aviation, biotechnology, optics and pharmaceutical sectors. One example of public support for international clusters is the project Clusters Linked over Europe (CLOE), a European network of excellence for cluster management, matching and promotion, supported by EU programs. Networks also form to **support specialized functions**: for example patent marketing and technology transfer; coordination with research organizations; or support for innovation finance. The possibilities are linked to the needs of technopoles and their clients.

Policy initiatives support the formation of networks. For instance, in the European Union, small to medium-sized enterprises (SMEs) account for two-thirds of employment and a similar proportion of business turnover. However, SMEs find it very difficult to operate outside their local market, although their participation in a European market place would be beneficial for global trade. Therefore, many public initiatives organize specialized networks to support the operations of SMEs beyond national boundaries. For example, public initiatives have formed networks: to support technology transfer between SMEs; to introduce venture financiers to small high-technology companies; and to help high-level researchers move between universities and specialized high-technology companies. Sometimes, **public-private interests** cooperate to develop groups of incubators or science parks in a country, which subsequently lead to national networks. The focus here is often on **technology-led urban development**, and on synergy between universities and industry.

Networks of technopoles operate in parallel in some countries: some are formed on a purely commercial basis, and some with public funding and public objectives. These networks can co-exist and offer different types of services to their members. The overall intention of all these networks is similar: to come together to share knowledge and resources and to improve outcomes. As the manners in which networks develop are different, it is these outcomes which prove that there is more than one path to success for network-based development[2].

Publicly supported networks are often organized in tiers: first as small consortia organized on a regional or national basis, and then into super-networks at international level. The same is true of **networks of innovation poles**. In many countries, innovation poles form national or specialized networks, such as the United Kingdom's Science Park Association (UKSPA). Representatives from these national bodies also meet with those from other countries in international networks. Finally, networks coordinate internationally in organizations such as the International Association of Science Parks (IASP) and the World Technopolis Association (WTA).

Checklist for technopoles joining networks

• What local, regional, national, and international networks exist and are open and of interest to the technopole?
• Can the technopole provide resources to participate fully in the network (membership subscriptions, meeting participation, communications, etc.)?
• What criteria have been established to choose between different networks?
• Who in the technopole, can best contribute to the network?
• How can exchanges be diffused from the network to the technopole?
• Have measures been established of outcomes expected from participation in the network(s)?

2 See, on this point, the conclusions of the workshop "Innovative Metropolitan Territories: Technology Parks and Competitiveness Clusters" organized in June 2007, in Tunis, Tunisia, by the World Bank, Marseille City Council and GTZ, in partnership with the Urban Community of Marseille-Provence Metropole, Marseille Innovation and the Marseille-Provence Chamber of Commerce and Industry, and under the patronage of the Tunisian Ministry for Research, with the support of Tunis City Council. For details see also http://www.euromedina.org/

2.3 The connections between technopoles and networks

Technopoles form, or link into, networks in order to: formalize relationships that bring synergy and benefits to stakeholders; benefit from connectivity and synergy across the network; enhance services provided to clients of innovation poles; develop network members through professionalizing services; and undertake benchmarking between network members (innovation poles). Each of these aspects of network membership is examined below.

Networks tend to emerge from shared interests and the need for a common exchange platform. The shared interest may be a shared goal, proximity, or a single technology, or a common client (for example, shared interests may include, cooperation on the design of components for a common client or industry). Networks can grow organically, being formed by a group of players with shared interests, such as clusters of companies or a group of business support organizations. At some point, the decision is made to formalize the structure. Networks serving this type of group are characterized by an interest in industry standards, a common technology, or streamlining delivery cycles. These clusters often start out small, and frequently deal with local interests: agro-food technology, or common tourism campaigns, for example. Clusters can evolve into worldwide industry supply chains, as seen with aviation, optics, petro-chemicals, pharmaceuticals, telecommunications, etc. The differences in network needs are proportional to the size and scope of the cluster.

The creation of new networks can also be stimulated by top-down actions. Regional agencies and commercial innovation-support organizations can provide budgets or infrastructure to bring companies, or other relevant organizations, together. Urban development programs frequently bring industries together in one geographic location to profit from common infrastructure and to share state-of-the-art resources, including access to university knowledge. This can encourage the emergence of technopoles, which in turn bring together innovation players and support them in their common objectives. Networks that emerge in this situation may address: local infrastructure issues; national and international topics such as legislation on taxation or trade tariffs; or support for clients of the innovation pole. Networks that have emerged from this environment include, for example, specialized networks of science parks and incubation centers, and networks for assisting high-technology companies to access finance.

More recently, governments have undertaken innovation policy development, including foresight analysis, and the selection of specialized technologies. The intention is to pick fast-growth, high-technology sectors, to leap-frog industry cycles, and to have clean industries that provide local employment and support modern economies. Planning for innovation brings together high-level players from research, education, industry, and many layers of government. The outcome may be islands of high-technology best-practice that peg themselves to international standards. These high-technology nodes must be linked to their international counterparts. In this case, networks may emerge from international research teams and universities, and public programs that support research. These high-level initiatives have given rise to specialized networks and exchange platforms, such as international technology platforms, or integrated industrial projects.

All networks, regardless of their size or focus, need some formalized agreement and structures and common exchange platforms (Internet forums, etc.) to reduce the costs of knowledge exchange. Some of the tools, which a network will need for managing its internal processes and its services to clients, are mentioned in the checklist. It must be noted that developing new tools and platforms is not a trivial investment. The way in which tools and platforms evolve, and how they are paid for, is linked to how the network emerged.

Networks emerging organically from industry clusters commonly have membership subscriptions. Local initiatives that bring industry together in one location, or a common network, may involve paying a rent or a membership fee, but may also benefit from local government support. Indeed, top-down initiatives are commonly supported during both the inception and development phases. Financial support may take the form of paying, fully or partially, for research, network meetings, and a central secretariat. Over time, these initiatives may be expected to generate sufficient revenues to allow public sector support to be discontinued. Sometimes, networks are not intended to be permanent and are discontinued when an initiative has reached its logical conclusion.

In addition, a number of networks address special innovation issues. For example, the struggle of small companies to ensure their growth is largely dependent on access to finance. Two specialized networks in Europe support the innovation sector with mechanisms to improve access to finance: the European Business Angels Network (EBAN) and the European Venture Capital Association (EVCA).

Other networks also serve companies and individuals directly as well as technopoles. The European Association of Research Managers and Administrators (EARMA) and the ProTon Europe initiative both seek to support innovation management professionals through training, organized employment exchanges, and professionalization of individuals and organizations working to support innovation. They publish guidelines and training manuals for their members. Specialized networks offer services both to technopoles and to their end-users. For example, the services may be the identification of technology transfer opportunities or they may be targeted at SMEs as in the case of the INSME network. Network services are as varied as the clients of innovation poles.

Given that so many networks serve technopoles, the issue is often how to identify which networks to join, and how to select the appropriate networks, given resource limitations, so as to optimize the exchange. Getting the best results from network membership depends on the network processes or exchange tools, and also on who acts as an interlocutor to the network. Interactions with the network must involve a sufficiently high-level representative from the technopole to allow for strategic exchanges and high-level decision making. Moreover, the interface between the network and the technopole must be sufficiently active so as to bring decisions close to local players and to create dynamic activities. Open exchange and knowledge sharing is the key to success.

Checklist for setting up next steps of networks

- Is there a common goal and a need for dialogue among the group of players?
- Is an agreement needed about the new structure (network) to coordinate actions and services?
- Is the need for a network emerging from top-down policy decisions for a region or country?
- Does agreement exist on how to organize, and pay for, the network's services?
- Is there an agreement on a legal structure to adopt, physical location, staffing, etc.?
- Have competition issues been addressed?
- Is the network based on an appropriate business model and timeframe?
- Does the network foresee common definitions, and implementation, of standards and tools for network policy rules?

2. Connecting the technopoles and the power of networking

2.4 Funding and governing networks

When networks formalize their existence they must chose a legal form (or **legal personality**). A legal personality is tied to an address and is governed by a legal framework. The type of legal personality adopted is commonly determined by the geographic base of the network, the intended scope of its activities, its stance regarding risk, and its intention regarding profit taking and taxation. Common types of legal personalities for networks in the European Union include: limited companies, charities, foundations, European Economic Interest Groups (EEIGs), and consortia or projects funded by public organizations. In some countries, public sector support networks are established under special, non-profit-making government charters. When EU public authorities seek to help establish new networks, they may publish calls for proposals or calls for tenders. This process is often governed by public procurement legislation.

It is quite common for networks to adopt a **non-profit-making legal personality**. The network can make profits on individual activities, such as training or annual meetings, but the overall objective of the network owners is not to draw profits out of the network, but rather to reinvest any profit in network operations and development.

Having determined the appropriate legal personality, networks must choose the internal organization of their governance and control systems. Traditionally networks establish **governing boards**, executive boards, and/or secretariat services. In addition, they may have external expert advisory bodies. Board membership is determined by the legal personality and statutes, or charter, of the network. It is common for board members in a network to change over time and to reflect the distribution of stakeholders within the network. For publicly funded networks, the central secretariat is commonly fully funded by the interested public players. **Financial control** is commonly ensured through mechanisms including a clear division between the governing and executive boards, financial audits, publication of financial reports, and rules on incurring costs.

The scope of a network's activities determines **the costs it will incur**. Network costs may include: IT tools (including an exchange platform, a website, a database); meetings (including training and annual conferences); the development of the network's common agreements or standards; publications (including promotional brochures and benchmarking reports); and network administration (including a central secretariat). Networks with a private legal personality generally cover their costs though membership or subscription fees. Within networks that emerge from a public-sector call, members' integration in the network is partially or fully subsidized. It is possible to combine different funding mechanisms; for example, members whose network participation is paid for through subscriptions or public support receive core services free, but may be required to pay to participate in special services or events, including training or annual conferences.

Regarding **subscriptions**, it is common for networks to have more than one type linked to different membership categories. For example, members may be categorized as corporate members or individual members. Membership categories may be linked to the number of individuals who can receive network core services or attend meetings. Many networks seek corporate **sponsors**, particularly for the organization of events, or to cover large infrastructure costs. Typically, sponsors have an interested relationship with network members, and both benefit from the sponsorship deal.

The governance and funding of networks is rarely static. In fact, networks lend themselves to **changing structures**. For example, the European Commission (EC) established two networks: the Innovation Relay Center (IRC) Network, and the Europ Info Center (EIC) network, both of which were organized on a regional basis through national and regional nodes. These networks had separate central secretariat services following calls for tenders. The secretariats were made up of private organizations organized in consortia. At some times, the secretariats were responsible for members' contracts and at other times for network members' performance review and support, but not contracts. In 2008, the two networks were combined into a single network called the Enterprise Europe Network (EEN), governance of which was assigned to the Executive Agency for Competitiveness and Innovation (EACI). The network is open to non-EU members. Partial funding of members by the European Commission (EC) is possible, based on their location, if the interested country has a cooperation agreement with the EU.

Checklist for selecting a legal personality for a network
- Did the network emerge from a public or private initiative?
- Is it necessary and appropriate to create a new legal personality?
- Will the network operate for a fixed period of time or continue indefinitely?
- Who owns, and will be legally responsible for, the network?
- How will network owners insulate themselves against operational risks?
- Do network owners intend to take profits out of the network, and / or pay taxes?
- Will the network offer services across national boundaries?

Checklist for management structures
- Is the management structure appropriate to the network's legal personality?
- Are network functions, i.e. strategic, executive and financial, organized separately?
- Does the network have sufficient resources for its strategic, managerial, and operational missions?
- Will management structures change over time?
- Are agreed governance procedures known to network members?

Checklist for funding networks
- Does the network perform a public role and can it receive public support?
- Does the network have a profit-making objective?
- Does the network have a business plan or sustainability plan?
- What costs will the network incur, and over what time period?
- Can network membership grow over time and / or can sponsors be attracted?
- Do members agree to different categories of membership and services?
- Will network services be open to non-members?
- What do other networks charge for equivalent services?

2.5 Examples of networks of technopoles

Technopoles have formed a variety of networks which are organized regionally, nationally, and internationally. In addition, technopoles group themselves into networks that offer special support. Technology transfer, business services or incubator support, industry clusters, and innovation finance are just some examples.

National science park associations form networks. For instance, the mission of the **United Kingdom Science Park Association (UKSPA)** is to be the authoritative body on the planning, development and the creation of science parks that facilitate the development and management of innovative, high-growth, knowledge-based organizations. However, **membership of UKSPA is not restricted to UK-based organizations.** Furthemore, UKSPA members are additionally involved in the following networks: EBAN, EVCA, IRC, and the International Association of Science and Technology Parks.

In many cases, science parks are involved in more than one network. **AREA** is a predominantly public initiative in Italy which brings together research and public organizations and was founded in 1978 as **Italy's national science park coordinator**. AREA is a multi-sector science and technology park that carries out research, development, and innovation activities aimed at achieving excellence. It is a reference in Italy for technology transfer. AREA is a member of APRE, an Italian network that promotes the creation of partnerships enabling research bodies and regional companies to take advantage of European research programs. To support technology transfer, AREA joined the IRC Network, by responding to an EC call for proposals. To support exchanges of highly qualified researchers, AREA joined ERA-MORE, the European Network of Mobility Centers. Finally, AREA is also a member of HiCo, Hi-tech Integrated Cooperation, a technical and economic development network in the border regions of Friuli, Venezia, Giulia and Slovenia.

2. Connecting the technopoles and the power of networking

Box 1

Major European and international networks of science parks and technopoles

Launched in 2008 by the European Commission, the EEN (Enterprise Europe Network) combines and builds on the former Innovation Relay Centre (IRC) Network and the Euro Info Center (EIC) network, established in 1995 and 1987, respectively. The IRC focused on technology transfer and the EIC on business information and support. The network is made up of regionally or nationally organized networks, coordinated centrally by the Executive Agency for Competitiveness and Innovation (EACI). In 2008 the EEN was present in more than 40 countries, with around 4,000 experienced staff in 600 local partner organizations providing expert advice and services to EU businesses. Organizations outside the EU can submit proposals to join at a later date, on a non-funded basis. The new integrated network offers a one-stop shop to meet the information needs of SMEs and companies in Europe.

The International Association of Science and Technology Parks (IASP) is the worldwide network of science and technology parks. It was created in 1984 and has its headquarters in Spain. IASP connects science park professionals from across the globe and provides services that drive its members' growth and effectiveness. Members enhance the competitiveness of companies and entrepreneurs of their cities and regions and contribute to global economic development through innovation, entrepreneurship, and the transfer of knowledge and technology. In 2008 IASP had 359 members, involving 150,000 companies located in IASP member parks in 74 countries divided between five regional divisions: IASP Asia-Pacific, IASP Europe, IASP Latin America, IASP North America and IASP West Asia. Between 1984 and 2007, IASP organized 24 world and 42 regional conferences. IASP is a founding member of the World Alliance for Innovation.

Another example of a network of science parks and poles is the World Technopolis Association (WTA), a multilateral cooperative international organization. The main goals of the WTA are to promote regional development and prosperity through exchanges and cooperation among science cities and to contribute to the happiness and well-being of all peoples through the advancement of science and technology. The World Technopolis Symposium in 1996 was a preliminary event which led to the establishment of the WTA, which formally emerged in Daejeon, Korea. The Daejeon Metropolitan City made special efforts for the WTA: first, it sought the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as an affiliate; second, it set aside part of the city municipal budget for the WTA and secured a subsidy from the Korean government. The WTA is pushing ahead with international cooperative research projects and building an information network among members.

Checklist for how non-EU countries can join the EEN

- Non-CIP (Competitiveness and Innovation Program) countries can participate in the EEN Network.
- Only one consortium will be admitted per non-CIP country.
- Proposals from eligible non-CIP countries to cooperate with the EEN network, on an unfunded basis, may be submitted under the CIP until 2013, under Article 21.5 of the CIP.
- The eligibility criteria and the proposal documents can be downloaded from: http://ec.europa.eu/enterprise/funding/files/themes_2007/eic_irc/calls_prop_2007_eic_irc.htm

Note: EEN members responded to a 2007 call for proposals from the CIP.

2.6 Other critical networks

A number of specialized networks do not focus on bringing technopoles together. Some target **services offered by the technopole** to its clients. Other networks form to **support specialized functions**: for example, TechnologieAllianz is a German network of patent marketing and technology transfer agencies. Many specialized networks operate internationally, but are organized nationally[3].

Certain specialized networks support access to funding (business angels, venture capital, sectoral funds, etc.). One of these, the **European Private Equity and Venture Capital Association (EVCA),** represents the European private equity sector and promotes the asset class both within Europe and throughout the world. EVCA's role includes: representing the interests of the industry to regulators and standard setters; developing professional standards; providing industry research; professional development and forums; and facilitating interaction between its members and key industry participants, including institutional investors, entrepreneurs, policy makers and academics. EVCA's activities cover the whole range of private equity: venture capital (from seed and start-up to development capital), buy-outs and buy-ins.

A network can serve more than one need of an innovation pole: it can be both a network that provides support to technopole employees or stakeholders and one which specializes in a technology relevant to the technopole. The **Centre of Excellence for Applied Research and Training (CERT)** for instance, was established in 1996, and constitutes a hub for a network of 13 higher colleges of technology in Dubai[4].

One of the more important aspects of network participation is synergy and exchanges of experience. It is not only top-level decision makers who participate in networks. Those who implement various technopole services and provide support to clients can learn from, and share, their experience in networks. Innovation poles join many networks in order to **establish and maintain connectivity and synergy** in, and between, the innovation poles, to connect to the local and wider region, and to support special interests[5].

Sometimes, specialized clusters are very large, especially in industries requiring world-class technologies. Representatives of France, Germany, and Switzerland, working in life sciences, business, and economic development, helped to create a network of science, industry, politics, and finance. Cooperation between life-sciences and medical-technology companies, including major global players in the pharmaceuticals and agro-chemical sector, 40 scientific institutions and four universities, and about 280 research groups, has resulted in one of the largest biotechnology regions in Europe, called BioValley[6]. It goes beyond the organization of local activities and requires active cluster management.

3 Among other examples, there is the Red de Officinas de Transferencia de Resultados de Investigación (RedOTRI), the Spanish Network of University Knowledge Transfer Offices, or the European Network of Mobility Centers for Researchers (ERA-MORE) for researchers wishing to work in a country other than their own and for organizations willing to recruit talented European and non-European researchers. A support network exists in 32 countries through 200 centers. Services provide information on research fellowships and grants, at European, national, and international levels. The service is free of charge and supported by the European Commission. The National Scientific and Technological Research Council of Turkey (TÜBITAK) uses ERA-MORE to draw its skilled scientists back home to Turkey. **4** CERT operates two science and technology parks, one in Abu Dhabi and one in Dubai, which provide access to world-class experts in technology through more than 20 multinational partners. The Dubai Technology Park, launched in 2002 by the Ports, Customs and Free Zone Corp (PCFC), is designed to attract foreign investment in research in oil and gas, desalination, and environment management. **5** The Baltic Association of Science / Technology Parks and Innovation Centers (BASTIC) brings together associations of science parks active in the Baltic countries. There are three member associations: the Association of Lithuanian Innovation Networks (ALIN), the Latvian Association of Technology Parks, Centers and Business Incubators (LTICA), and the Association of Estonian Science and / or Technology Parks (AESTP). BASTICS is a member of: AESTP, a national network supporting trade (common market) needs; ALIN, a national network supporting trade (common market) needs; IASP, an international association of science parks, which allows for study visits and comparison of practices; IRC to support international technology transfer exchanges for BASTIC; LTICA, a national network supporting trade (common market) needs. Effective participation in networks involves many categories of innovation pole stakeholders. **6** In the late 1980s, the idea emerged to create a "Silicon Valley" dedicated to biotechnology in the Upper Rhine Region. A BioValley Promotion Team implemented the concept in the late 1990s, and a budget of EUR 2.2 million was received through EU regional/structural funds. A new legal structure for the BioValley was created, involving three national associations and one central tri-national association. In the mid-2000s, EUR 2.8 million was allocated from EU structural funds to "BioValley: from network to tri-national biotech cluster." In 2008 the BioValley had 600 companies: including 40% of the world's biggest pharmaceuticals companies, and 50,000 biotechnology sector jobs. It has 40 scientific institutions, and 100,000 students. It includes 11 life sciences parks, 12 universities and academic institutes offering life sciences, biotechnology, chemistry or nanosciences curricula. It has over 30 qualified technology platforms for scientific services, including screening, ADME, spectroscopy, NMR, phenotyping, clinical research, etc.

Such interactions influence the services delivered and can help to professionalize innovation pole services. Only a small number of specialized networks relevant to innovation poles have been mentioned here, but references to portals which can provide further information are provided at the end of this Annex.

Checklist for joining specialized networks
- What are the specialized networks relevant to the technopole?
- Does the technopole have a special office / person capable of fully engaging with the network or does it need to establish new or special structures for this purpose?
- How can specialized network expertise be diffused to the technopole and its clients?
- Have measures of expected outcomes from network participation been established?

Checklist for networks' services for technopole stakeholders
- Which specialized networks are relevant for technopole stakeholders?
- What services provided by networks are open to technopole stakeholders?
- Can technopole stakeholders be members of the network, or is it more effective for the pole to be a member and disseminate information to its stakeholders?
- Are there economic implications to stakeholders' or the technopole's membership in a network and does this affect access to services?
- Can training be provided by the network on the technopole site?

2.7 Contribution to the professionalization of technopole services

Networks serve the interests of innovation organizations, at the level both of the innovation pole and of individuals. Networks can support professionalization through: open exchanges and knowledge sharing; publication of materials that advance knowledge; staff exchanges; training; organization of exams; formal qualifications; identification of good practice; and benchmarking.

Participation in networks takes place through human interaction: individuals involved in technopoles benefit from network participation, and can pass this benefit on to customers and stakeholders. Therefore, technopoles can be improved through employee training and service improvements resulting from interaction with networks. Part of the process of service professionalization includes **developing specific tools** such as checklists, guidebooks, manuals, quality procedures, and general training materials.

Some **networks focus on developing the individual** as an actor in his / her organization. For example the European Association of Research Managers and Administrators (EARMA) focuses on the knowledge of individuals within their organization (university, research laboratory, etc.). Another example is Technology Innovation International (TII), an independent European association of technology transfer and innovation support professionals.

Some publicly supported initiatives organize and deliver formal training in innovation support skills. The ProTon Europe network, supported by EC research program funding, has organized **professional training programs and qualifications** for individuals responsible for innovation support. The training includes: setting up and managing a knowledge transfer office; patenting and IPR management; licensing; university-industry collaboration; and spin-off and campus companies. Finally, professionalization can occur through benchmarking of services across the network (see below).

Checklist for training and professionalization
• What type of training do network members or their clients want?
• Do network members or their clients have unrecognized training needs?
• Can the network contribute to enhance members' skills?
• Can the network award qualifications?

Checklist for developing networks
• Does the network seek to grow and improve?
• Does the network seek to renew itself through expansion and/or dialogue?
• How independent and reliable are the performance criteria?
• Is there a recognized best practice in the network or internationally?
• Have performance measures been established and agreed by network members?
• Is performance benchmarking of members undertaken and reviewed regularly?

Checklist for network tools and platforms
• What network agreements are needed: network rules, an organizational charter?
• What standards should be developed: ethics, quality criteria, international standards, etc.?
• Who will control rule compliance (network secretariat, code of conduct)?
• What is needed to manage innovation services: confidentiality and competition, intellectual property rights (IPR), technology transfer (TT) agreements, etc.?
• What communication platforms are needed: databases, website, brochures, etc.?
• Who owns learning tools: network members, training contributors, public?

2.8 Benchmarking technopole performance

Benchmarking is an additional aspect of network membership and is relevant to technopole management. Benchmarking allows a technopole to evaluate itself in relation to best practice across the network. This requires network members to agree to study their activities and to compare results and outputs, and to share this information, often in the form of a report. When benchmarking is undertaken on an ongoing basis, overall improvements and changes across the network can be observed. Ongoing benchmarking is frequently linked to agreed evaluation criteria and performance indicators. All of this establishes quality systems and contributes to a process of continuous improvement.

Benchmarking provides a route to success. It facilitates planning to improve the quality of services within the technopole. As services are upgraded, all participants in the benchmarking process move towards best practice. Any deficiencies in results will provoke action plans to improve performance.

The **Innovation Relay Center (IRC) network**, which focused on technology transfer, triggered a process to compare network member outputs. Common standards and outputs from the network were proposed by an advisory group and subsequently agreed upon. The types of outputs measured across the IRC Network included: the number of cases in which technology transfer assistance was provided to clients; the number of technology transfer agreements; group meetings of participants, all compared across the network and taking into account the number of personnel in each network member or node. Annual reports captured results and, over time, overall network outcomes improved. Any network members who had difficulty in reaching outputs were supported by a central IRC secretariat, through training and direct interventions.

2. Connecting the technopoles and the power of networking

Another interesting example is provided by the **Innovating Regions in Europe (IRE) network**, created by the European Commission in the mid-1990s. Its aim is to facilitate the exchange of experience and good practice among European regions that are enhancing their capacity to support innovation and competitiveness among regional firms through the development and implementation of regional innovation strategies and schemes. In 2008, over 230 regions were members of the IRE network. The majority of IRE regions have developed regional innovation strategies (RIS).

The European Commission published, in 2004, a call for pilot projects on benchmarking. The types of organizations involved were: regional administrative and political authorities, development agencies, and regional innovation support organizations. Eight pilot projects on benchmarking were launched, involving 36 regions across Europe. Some of the regions had leading industrial zones with high growth, while others were poorly developed or declining regions. The projects adopted different methods for benchmarking innovation strategies. Measures were applied to innovation strategies and services at regional, science park, and services levels. These projects made it clear that, even if innovation strategies exhibit significant differences, the results can be benchmarked with a view to improvement.

Activities of organizations within a network are very diverse, and selecting the outputs to be measured is a challenge. For instance, many technopoles are established with the expectation that they will exert a positive influence on economic growth and technology-based developments in their environment or region. The strategy behind this thinking can be high-level, outcomes may only be expected in the long term and the outputs may be difficult to measure.

Benchmarking across network members contributes to a mutual learning environment. One of the expected outcomes of network membership is synergy. Benchmarking allows members to improve their performance to reach the level of the highest network performer. Networks that identify best practices, and compare outcomes, perform better than those that do not.

Checklist for benchmarking through networks

- Does the network identify good and/or best practice?
- Do network members have results and outcomes that can be compared?
- Does the network have common evaluation criteria?
- Has the network established performance indicators?
- How can the technopole organize itself and dedicate time to measuring outcomes and results?
- How can feedback from benchmarking, both negative and positive, be translated into concrete actions?

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European Commission, DG Enterprise (EC DG ENT)
http://ec.europa.eu/enterprise/

Seventh Framework Programme for Research and Technological Development (FP7)
http://cordis.europa.eu/fp7/

Competitiveness and Innovation Framework Programme (CIP)
http://ec.europa.eu/cip/

Innovation portals

European Association of Research Managers, & Administrators (EARMA)
http://www.earma.org/

European Business and Innovation Centre (BIC) Network (EBN)
http://www.ebn.be/

European Business Angel Network (EBAN)
http://www.eban.org/

European Private Equity and Venture Capital Association (EVCA)
http://www.evca.com/

International Association of Science Parks (IASP)
http://www.iasp.ws/

International Network for Small and Medium Sized Enterprises (INSME)
http://www.insme.org/

World Technopolis Association (WTA)
http://www.wtanet.org/

3 Challenges and main features of the financial sector in the Mediterranean countries

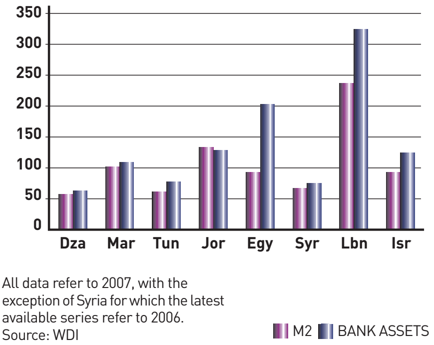
3.1 An analysis of financial markets in Mediterranean countries

The financial landscape of Mediterranean countries is heavily dominated by the banking system, which will be the focus of this analysis.

Mediterranean countries have reached, over the last decades, a fairly high degree of banking sector development. Macroeconomic indicators of size, liquidity, and level of intermediation support this view (see Figures 3.1 and 3.2). Broad money (M2), a standard measure of liquidity and depth, exceeded on average 100 percent of GDP last year, which is well above the average for middle income countries (74 percent). Bank deposits are also quite high, averaging over 70 percent of GDP in 2007 (94 percent when Lebanon is also accounted for). More generally, banking activity has been expanding over the last few years: increased oil-related liquidity in the broader Middle East and North Africa region has had positive spillovers for Mediterranean countries and has contributed to an increase in both deposit and credit growth. In Algeria, for instance, credit to the private sector has increased fourfold in nominal terms and doubled as a ratio to GDP since 2000, although it remains low by international standards at 13 percent of GDP (23 percent of non-hydrocarbon GDP) as of end 2007. At the other end of the spectrum, Israel, Lebanon and Jordan enjoy extremely high credit-to-GDP ratios, while in Morocco, the authorities' efforts to deepen financial intermediation along with booming domestic demand have boosted credit growth. In Egypt, private sector credit has declined since 2004, but this is largely due to substantial repayments on non-performing loans in the context of the restructuring of the banking sector.

Figure 3.1

M2 and Bank Assets

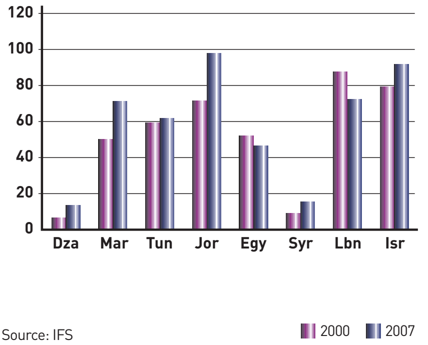


All data refer to 2007, with the exception of Syria for which the latest available series refer to 2006.
Source: WDI

Figure 3.2

Credit to the Private Sector

(% of GDP)



Source: IFS

3. Challenges and main features of the financial sector in the Mediterranean countries

Table 3.1

Financial development index (scale: 0-10)

Countries	1960s	1970s	1980s	1990s	progress*
Algeria	2.4	4.2	5	2.7	0.3
Egypt	1.7	1.9	3.5	3.8	2.1
Jordan	3.1	3.7	5.3	5.4	2.3
Lebanon	5.1	6.7	9.6	6.4	1.3
Morocco	2.6	2.8	3	4	1.4
Syria	2.2	1.9	1.8	2.3	0.1
Tunisia	3.3	3.8	4.5	4.8	1.5
Industrial countries	3.9	4.6	5.1	5.9	2
Asian Tigers	1.8	2.9	4.1	5.7	3.9
Latin America & Caribbean	2.4	2.9	3	3.4	1
South Asia	1.6	1.7	2.4	2.7	1.1
Sub-Saharan Africa	2.3	2.5	2.3	2.1	-0.2

Source: Creane et al. IMF, 2004

* Progress in financial deepening since the 1960s is measured as the difference between column 4 and 1.

Table 3.1 summarizes the situation with a snapshot of the banking sector in Mediterranean countries over time. It illustrates a "composite" index of financial depth developed by Creane et al. (2004) based on some of the above-mentioned quantitative indicators: M2 to GDP; assets of deposit banks to assets of the central bank; deposit banks; reserve ratio; and credit to the private sector by deposit banks to GDP. The index suggests that while the degree of financial intermediation is generally consistent with the size and development of these economies, the process of financial deepening is far from complete and progress has indeed been somewhat slower than in industrial countries and fast-growing Asian economies. Moreover, financial development has been uneven across countries in the region, with Lebanon and Jordan featuring well-developed banking sectors, while Syria and Algeria lag behind. Somewhere in between, Egypt, Tunisia, and Morocco have, in recent years, made big strides to deepen structural and financial reforms.

Table 3.2 takes a broader perspective by estimating an alternative, multi-dimensional index of overall financial development, drawing upon a wide array of qualitative and quantitative indicators aimed at assessing, among others: the efficiency of the banking sector; the depth and liquidity of the non-bank financial sector; the appropriateness of the regulatory framework; the market orientation of monetary policy; and the degree of competition and financial openness. Despite some important achievements and the generally high scores in banking sector development, the overall financial sector in Mediterranean countries remains small and undiversified. Moreover, while Mediterranean countries generally perform well in terms of regulation and supervision, the institutional environment is poorly developed.

Table 3.2

Overall financial development: a multi-dimensional index

Country		Banking sector	Non-bank fin. sector	Regulation supervision	Monetary policy	Financial openness	Institutional environment
High							
Lebanon	7	8.7	3.3	7.7	8.3	7	5.2
Jordan	6.9	7.1	6.3	8.7	6.5	8	5.4
Medium							
Tunisia	5.6	7.7	4.7	5.3	4.5	5	5
Morocco	5.5	5.6	4.7	7.3	6.8	4	3.8
Egypt	5.4	6	6.3	5.3	5.6	6	3.2
Medium-low							
Algeria	3.2	2.5	3	3.5	4.4	4	2.3
Low							
Syria	1.1	1.9	0.7	0	0.9	0	2.4
Average	**5**	**5.6**	**4.1**	**5.4**	**5.3**	**4.9**	**3.9**

Source: Creane et al. IMF, 2004

In spite of its depth, the banking sector has yet to become an effective tool for channeling resources towards productive use[7]. Investment climate surveys conducted throughout the region by the World Bank show that access to finance, and the cost of this finance, is often cited as a major constraint to investment and growth. Firms in the Middle East and North Africa reportedly have less access to bank finance than in any other region in the world, with banks providing a mere 12 percent of investment funding. While this phenomenon is less puzzling in countries where the vast majority of banks are in public hands and the role of the state in the economy is pervasive, it is quite surprising to find that in countries such as Egypt or Morocco, with a relatively high level of credit penetration, banks provide only some 20 percent of new investment finance. Moreover, despite the fact that bank assets as a share of GDP have been increasing, the ratio of loans to total assets has decreased over the last decade and is now slightly above 60 percent. This divide between the financial sector and the real economy is even more acute when it comes to small enterprises, with banks displaying a keen preference for low-risk assets, such as cash and deposits with the central bank, and government bonds.

The dominant position of state-owned banks has undoubtedly played a role, not only because a substantial share of credit has been directed to the public sector, leaving little room for private sector lending, but also because it has hindered the development of a strong credit culture: high risk aversion and centralized credit allocation are common features of state-owned banks, which have traditionally found it easier to lend to a few large borrowers capable of providing solid collateral rather than venturing into the more dynamic, but also more uncertain, domain of SME financing. For their part, banks in the MEDA region argue that the lack of reliable financial information and, most importantly, of high-quality investment opportunities are the main causes of limited enterprise financing.

7 For an in-depth analysis of the "disconnect" between the financial sector and the real private economy in MENA, refer to the World Bank 2006 report: Economic Developments and Prospects – Financial Markets in a New Age of Oil.

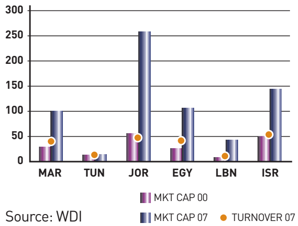
3. Challenges and main features of the financial sector in the mediterranean countries

The underdevelopment of the non-bank financial sector is another factor behind difficult access to finance. While buoyant economic activity and abundant capital inflows from oil-rich neighboring countries have helped to boost stock markets across the region – market capitalization as a ratio of GDP surged in most countries from an average of 32 percent in 2002 to 113 percent in 2007 – stock exchanges in MEDA countries tend to be characterized by few listings, typically of large privatized companies. Bond markets, and the corporate bond market in particular, are still dormant while the venture capital industry remains small both in size of investments and in number of players. All in all, in spite of recent gains, non-bank finance does not represent a vehicle for smaller firms to raise capital. Further developing capital markets will not only inject a healthy dose of competition into a bank-dominated financial system, but will also provide new avenues for enterprise financing.

Figure 3.3

Stock market capitalization and turnover ratio

(% of GDP)

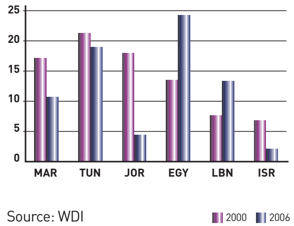


Source: WDI

Figure 3.4

Non-performing loans

(% of total gross loans)



Source: WDI

3.2 Implications for innovation financing

The previous section highlighted the divide between the financial sector and the real economy in MEDA countries, especially regarding financing of risky projects and SMEs, with little or no access to finance. These shortcomings compound the specific challenges to financing of technological development and innovation.

Banks and financial markets have usually concentrated their lending on the public sector or on a limited number of highly collateralized projects and large clients. In contrast, innovation and technological investment are marred by low expected returns, uncertainty and high risk. Indeed, in a competitive market the primary output of innovation investment is knowledge of a new process, which easily becomes public knowledge. The return on the investment cannot always be appropriated by the firm undertaking the investment, and this leads to underinvestment in innovation and R&D. Yet social return on innovation investment and R&D could exceed private return. Therefore, there is scope for government intervention, through an adequate intellectual property system, to support innovation activities, provide tax incentives and encourage research partnerships of various kinds, including through specific financing schemes.

Government involvement in innovation financing is reinforced by the high degree of uncertainty regarding the output and its timing. Such uncertainty is mostly concentrated at beginning of a project, and this further reduces the financing supply for which standard risk-adjustment methods do not work: some projects may still require financing even though they fail some return test at some critical date. This asymmetry in the uncertainty of innovation project calls for government intervention, either in the form of grants or highly subsidized financing or through risk-taking facilitation measures. The government should therefore be involved massively at the onset of a project.

Against this background, the creation of science parks and technopoles has successfully generated significant synergies and externalities. Government financing of innovation pole infrastructure can bring together different market players, including universities, industries, and researchers. They can be industry-specific, for instance in the areas of health, textile or information technology. Government financing offers some leverage which compensates for the non-internalization of the social returns. It can be a conduit for other forms of investment, such as debt or equity, by reducing some elements of risks and potentially reducing the temporal uncertainty of some innovation investment.

It goes without saying that in MEDA countries governments can go beyond financing by furthering financial market deepening and reform, enhancing competition, fostering the development of capital markets, and reinforcing the institutional environment. Fiscal policy can also help, not only by providing fiscal discounts and incentives to invest in R&D, but also by means of discipline, thus crowding in private investment. For instance, reducing banks' exposure to public debt could free resources to be devoted to the financing of productive and innovative investment by private enterprises, including SMEs. In this respect, the involvement of the state in the economy of MEDA countries could move away from areas (such as banking) where more competition and private sector involvement would be healthy (for innovation, R&D) and into areas where the presence of market failures calls for government intervention. Yet, as the analysis above suggests, these standard reforms may not be sufficient to stimulate innovation financing and the government could play a larger role, supported by international donors and bilateral cooperation.

3.3 Country cases

Algeria

Algeria's financial system is characterized by a unique combination of a mainly state-owned banking sector and a large and expanding domestic capital market fuelled by the financing needs of public enterprises. The financial system remains stable, largely because of the public banks' ability to draw on government support. This has hampered the development of an efficient and competitive financial market. In 2006, public banks accounted for 93 percent of total deposits and made 91 percent of total loans. Private banks represent less than 10 percent of the total banking sector assets and privatization of large public banks has been postponed. Banking penetration in Algeria is expanding, with commercial bank deposits amounting to 50 percent of the country's GDP. In 2006, almost 50 percent of public banks' deposits originated from state-owned enterprises, compared to only 5 percent in private banks. The large government involvement in the economy puts private banks at a competitive disadvantage. Loans to state-owned enterprises are exclusively in public banks. Non-performing loans in private banks are at less than 10 percent, a level lower that in public banks. Profitability is much higher in private banks, with return on assets and return on equity about 3 to 4 times higher than in public banks.

The development of the corporate bond market has been a significant achievement since 2002. The government encouraged public enterprises to issue bonds after it started issuing its own debt on a regular schedule, with corporate bonds now representing an alternative source of financing for state-owned companies (two private enterprises also issued bonds to finance their investments). The outstanding stock of corporate bonds in Algeria is about four times larger than the average for comparator countries and accounted for half of medium- to long-term bank credit to public enterprises. Bond financing has been at least 200 basis points cheaper than comparable bank loans. So far, public banks have been the main buyers of these bonds, but the growth potential of the corporate debt market is high in light of the investment programs of many companies and a strong appetite from the public.

3. Challenges and main features of the financial sector in the mediterranean countries

Egypt

Since 2004 the Egyptian authorities have been implementing a far-reaching economic and financial reform program with the aim of fostering economic growth and competitiveness. The financial sector reform has delivered remarkable results and progress in the banking sector has included privatization, consolidation, and improved supervision and regulation. Public sector banks continue to play a central role in the Egyptian economy (retaining a market share of approximately 40 percent): they have traditionally been heavily involved in the financing of both the central government and state-owned enterprises while taking a much more conservative stance towards the financing of private enterprise (and SMEs in particular). Credit to the private sector remains, at some 50 percent of total deposits, rather low even in comparison to other countries in the region (the ratio of private credit to total deposits of deposit bank is 80 percent in Morocco and over 100 percent in both Tunisia and Israel) and banks play a limited role, relative to their potential, in financial intermediation.

The non-bank financial sector remains small. Despite improvements in regulation and surging capitalization (largely stemming from price effects) and turnover, which jumped from 14 percent in 2001 to nearly 50 percent in 2007, the stock market remains rather illiquid: out of a total of 558 companies listed on the stock exchange, only around 200 are actively traded. The stock of tradable government bonds increased from 12 to 27 percent of GDP between 2001 and 2006, while corporate fixed income instruments represent a meager 1 percent of GDP. All in all, the capital market has not been able, so far at least, to provide sizable financing to the corporate sector but the potential for expansion is substantial. In this connection, the authorities seem to be well aware of the shortcomings of the Egyptian capital market and are focusing reform efforts on the non-bank financial sector and the stock market.

Lebanon

Lebanon's financial sector is one of the most advanced and well-developed in the Mediterranean region. Like other Mediterranean countries, Lebanon's financial system is bank-dominated, with stock and corporate bond markets playing a secondary role. Banks are the main financing source for the government, holding almost half of all public debt, both domestic and external. However, unlike most of its neighbors, banking activity in Lebanon has a distinctively private nature. Despite a delicate macroeconomic environment, the consolidated assets of Lebanese banks have grown impressively since the mid-1990s to reach some USD80 billion in 2007, more than three times the value of the country's GDP. Throughout this period the sector has attracted an equally growing volume of deposits, reflecting both an increase in the number of total branches as well as the continued capacity to attract savings from the Lebanese diaspora and other Arab countries. The massive liquidity attracted by the sector has been, however, primarily channeled to finance the public sector, while outside of the public sector banking activity has faced considerable difficulties. The business environment in Lebanon is, in fact, hampered by lasting political uncertainty. The banking system's loan book comprised a low 22.3 percent of total assets at the end of July 2007 following a downward trend in the last few years. The difficult business environment is also responsible for significant asset quality problems. At the end of 2006, non-performing loans held by Lebanese banks reached 18.5 percent of their loan portfolio. On the other hand, the handling by banks of problem loans appears quite effective, and the banks' lending portfolios remain well provisioned and collateralized, as provisions cover 81.1 percent of total doubtful loans. Another significant imbalance of the Lebanese banking sector is the maturity mismatch between liability and asset maturities, as long-term funding tends to be scarce. The average maturity of deposits is two months. Assets, on the other hand, have considerably longer maturities, notably those on credits to the public sector. This mismatch could leave banks vulnerable to a prolonged upturn in interest rates in the event of a potential devaluation or confidence crisis. The high degree of dollarisation also exposes banks to credit risk.

Tunisia

Despite some progress over the last couple of decades, Tunisia has a medium-sized bank-dominated financial sector, with equity and corporate bond markets playing only a secondary role. In line with the overall size of the financial sector, banking penetration in Tunisia remains relatively limited. The sector has been subject to significant reforms over the last few years, with the objective of making it more competitive and profitable. However, Tunisia's banking sector is still in the process of resolving significant asset quality problems: 20 percent of the sector's loan portfolio is non-performing, with loan loss provisions covering less than 50 percent of bad loans. This situation is partly a legacy of the government's past attitude toward the sector, where a rather interventionist strategy transformed (mostly) public banks into the disbursing arms of the government. The government has recently divested its participation in two banks, strengthened the regulatory framework for the financial sector, and started to implement a number of measures specifically aimed at solving the bad loan and the weak provisioning problems. While in the short to medium term this will place some downward pressure on banks' profitability – by increasing provisioning levels and boosting up capital levels – this strategy appears essential in order to bring the sector to its full potential for supporting economic growth and the development of a vibrant private sector in Tunisia.

The bond market has been gaining some depth and venture capital funds have been expanding quite rapidly: the number of players grew by 50 percent between 2000 and 2004, while assets jumped by 300 percent, to reach some 1.6 percent of GDP. The stock market remains small.

4 Definition

Technological collaboration
Collaboration between two projects/companies aimed at developing a (new) product or a service. The collaboration does not have any commercial objectives.

Joint venture (JV)
A type of partnership arrangement between two otherwise independent businesses which agree to undertake a specific project together for a specified time period. A JV can be incorporated – creation of a new business – or unincorporated.

Agent
An individual or firm that serves as the foreign representative of a domestic supplier and seeks sales abroad for the supplier.

Distributor
Distributors differ from agents in that they generally purchase the exporter's products, thereby taking ownership of the goods, with a view to reselling them in the target market.

Licensing
A business arrangement in which the manufacturer (the licensor) of a product or a firm with proprietary rights over certain technology trademarks, etc., grants permission to some other group or individual to manufacture that product (or make use of that proprietary material, trademark, manufacturing process, patent, etc.) in return for specified royalties or other payment to the firm granting the license.

Franchise
An authorization to sell a company's goods or services in a particular place.

OEM / VAR
OEM = Original Equipment Manufacturer. The original manufacturer of a hardware subsystem or component. For example, Canon makes the print engine used in many laser printers, including those from Hewlett-Packard; in this case, Canon is the OEM and HP is a value-added reseller (VAR)

Greenfield investment
Greenfield sites are investments to build a new plant or business in the target market.

NOTES

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France's second city, linking Europe and the Mediterranean, **Marseille** is a competitive, attractive and vibrant coastal metropolis of international standing. Marseille's international initiatives are an integral part of its local development policy. These initiatives are also an expression of the values that underpin its commitment to local democracy, solidarity among citizens and local stakeholder involvement in projects.

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