Science Parks designed as entities of the new paradigm: the *Knowledge (global-based) Society*

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ABSTRACT

The paper advocates that Science and Technology Park – STP, in order to be successful in the *Knowledge (global-based) Society*, the new *social paradigm* that emerges worldwide, must be designed and implemented as an *entity of this new paradigm*.

Next, the paper describes the *Methodology of Regional Innovative Development*, stemming from a *Latin American School of Thought* and aiming at to give support to STP implementation within the new social paradigm.

The methodology states that a STP design must begin with the construction of an adequate *conceptual framework*, able to grasp the circumstance in which the park is inserted, and the generation of a suitable *set of directives*, able to guide the implementation of the park.

Examples of the construction of *conceptual frameworks* and *sets of directives* are presented. These examples, along with a comparison between well-known science parks, subsidize the elaboration of comments about the future of science parks.

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Science Parks designed as entities of the new paradigm:

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Knowledge produces prosperity, but only *wisdom* may propitiate a world with a socially responsible development, without war, chaos and catastrophe [(1)].

I. Feasible and successful Science Parks in the *Knowledge (global-based) Society*

In order to be successful in the *Knowledge (global-based) Society*, the new *social paradigm* that emerges worldwide, a Science and Technology Park (STP) must be designed and implemented as an entity of this new paradigm.

For that purpose, a STP must be conceived and implemented with the support of innovative methodologies, created within the new paradigm, and not with traditional procedures stemming from the exhausted paradigm, the Industrial Society.

> There is a growing perception worldwide that conventional planning procedures became useless, and traditional business schools lost their way. These, and many other deep-rooted concepts and procedures, need to be reinvented [(1)].

An innovative methodology must enable STP designers:

- To construct a correct *conceptual framework* for each specific park;
- To extract, from perceptions and information with which the framework has been built up, an adequate *set of directives* to guide the conception and implementation of the park.

The *Methodology of Regional Innovative Development*, stemming from a *Latin American School of Thought* [(2)] and used by STPs in Brazil and Argentina [(3)], intends to be one of those new methodologies.

II. Methodology of Regional Innovative Development [(2)]

The *Methodology of Regional Innovative Development* advocates that:

1. The success or failure of any project - including Science and Technology Parks - begins with the definition of the directives that shall guide their design and implementation.

   > Remember the Titanic. Besides the disastrous command decisions at the fatidic night of the accident, the tragedy was also a result of the erroneous *set of directives* that guided the design of the ship. For example, the number of lifeboats was proportional to the displacement of the ship, according to the law at the time, not to the number of people onboard [(4)].

2. The creation of adequate directives to guide the planning of a science park requires, as a prior step, the set up of an adequate *conceptual framework*.

3. The construction of this framework transcends the traditional scope of analysis, often limited to the park objectives, socioeconomic context in which it is inserted, and SWOT analysis (strengths, weaknesses, opportunities and threats) related to the park. The construction of an adequate conceptual framework is a complex and time-consuming mission that must congregate multidisciplinary teams - including specialists as philosophers, sociologists and historians, beside traditional science park core group of professionals.

4. The construction of the framework is made in parallel to the generation of the directives that shall guide the design. Both activities – framework and directives generation - stem from creative conjugations of several *intellectual inspiring springs*, such as:

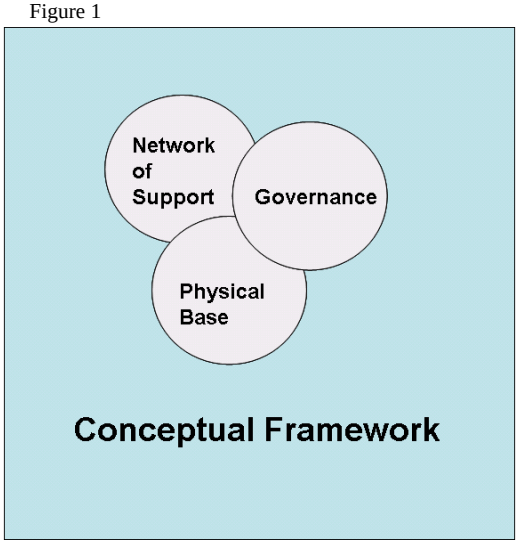
    - Lessons that can be extract from the experience of STPs.
    - The characteristics of paradigm transitions.
    - The characteristics of the new paradigm, the *Knowledge (global-based) Society*.
    - The philosophy of the development desired by the concerned community - *what kind of development and for whom*?
    - Local, regional, national and international context analysis.
    - Special studies on aspects that can impact significantly the STPs.

III. Comments on *intellectual inspiring springs* that subsidize STPs design

III.1. Lessons from the worldwide experience of STPs

A Science and Technology Park, according to the updated IASP definition [(5)], may be visualized as the conjugation of three spheres, as illustrated in the figure 1, inserted in a conceptual reference framework.

Figure 1



The ***Conceptual Framework*** is formed by the ensemble of theories, hypotheses, concepts and premises that explain and justify the models that are adopted for the park and guide its decision making process.

> This conceptual framework must grasp the circumstance in which the STP is inserted. It is build up with perceptions stemming from analysis and insights related to aspects as the origins and motivations for the park; the political, economics and cultural conditions prevalent in the context that hosts the park (town, region, nation, community of nations and the world); the surrounding natural conditions (as resources, row materials, climate, energy sources and geographical setting), and special studies – as forecasts.

The ***Physical Base*** is formed by the property in which the STP is set down and the infrastructures used by the tenants. Nowadays, the Physical Base became much wider and complex than it used to be a couple of decades ago. Besides properties that belong to the park itself, the Physical Base can encompass properties of third parts - including real estate disseminated in the urban texture, and even a *virtual space* [(6)].

The ***Governance*** sphere is formed by the institution – or institutions - that provide the STP's management, as well as the ensemble of philosophies that guide the initiative, translated into its mission, objectives and procedures.

The Governance conjugates two different and complementary functions, which are often performed by different institutions: the *Internal Governance* and the *Strategic Governance*.

- The ***Internal Governance*** is responsible for aspects related to the domestic operation of the park, as the commercialization of areas and buildings in the Physical Base, guidelines for the architecture, maintenance of buildings and infrastructures, services offered to tenants, and the marketing of the park - including the reception of visitors and potential clients.

- The ***Strategic Governance*** must enhance the synergy of tenants, universities and R&D centers and other agents of the innovation in the region and throughout the world. It must also perform an intensive and proactive promotion aiming at to make the park feasible, as well as to insure that the park contributes for a socially responsible and competitive regional development within the global economy of the Knowledge-based Society.

The ***Network of Support*** is formed by all the institutions that insure the park existence and operational conditions.

The use of this model allows a useful comparison, as it will be shown later on, between characteristics of well known STPs (Table 1).

Table 1.

STP	**Stanford Research Park** [7]
Year of foundation	1951
Physical Base	280 hectares, property of Stanford University, inside its campus.
Governance	Internal Governance: Stanford Management Company. Strategic Governance: seems to be performed by several entities, such as the S*tanford Affiliates Program.*
Remarks on the Conceptual Framework	The remarkable innovation dynamic of the Silicon Valley possibly eclipsed the need for a Strategic Governance within Stanford Research Park.

STP	**Cambridge Science Park** [8]
Year of foundation	1970
Physical Base	61 hectares, property of the Trinity College.
Governance	Internal Governance: a private company (Bidwells Property Consultants). The Strategic Governance seems to be performed by several entities, mainly the Trinity College and the *Centre for Entrepreneurial Learning*.
Remarks on the Conceptual Framework	In the 60s, the UK government urged universities to "expand their contact with industry with the objective of technology transfer and also to increase the payback from investment in basic research and an expansion in higher education, in the form of new technologies". Trinity College decided to develop a piece of land available as a science park, according to the idea born during the 50's in the USA, where the first science park was established by Stanford University. It seems that the model of the Stanford Research Park, in which the park's management provides only Internal Governance, was adopted by Cambridge Science Park. Perhaps the lack of a Strategic Governance may somehow explain the findings of SAXENIAN [9], in her assessment of the poor results of the park concerning the regional development in the 80's.

Table 1 – continued

STP	**Research Triangle Park** [10]
Year of foundation	1959
Physical Base	3.000 hectares, property of the Research Triangle Foundation of North Carolina.
Governance	Internal and Strategic Governance: Research Triangle Foundation of North Carolina, a private, not-for-profit organization that owns and develops the Research Triangle Park, established at the Park's launch in 1959. The Foundation is responsible for building and maintaining the physical aspects of the Park; attracting and retaining Park companies; **and enhancing the competitive position of the Park and the Triangle region**.
Remarks on the Conceptual Framework	In the 50's, North Carolina economy – which was based on traditional products as tobacco and textiles, was being eroded by products imported from developing countries. The analysis of examples as the Silicon Valley and the Boston area strongly suggested the knowledge-based economy as a possible new way. The Research Triangle Park was set up as an ambitious project, with objectives that transcended the conventional science parks purposes, as reflected in the Research Triangle Foundation of NC's Vision & Mission: ▪ Vision: A better life for all North Carolinians through sustainable knowledge and technology-based development that effectively balances human needs and humanities with economic opportunities. ▪ Mission: To promote university, academic, industry and government collaborations leading to the establishment and maintenance of research, scientific and technology-based facilities within the Triangle and North Carolina, creating quality jobs and opportunities for its citizens. The Research Triangle Foundation of NC has contributed for the set up of an outstanding and innovative high school, the *North Carolina School of Science and Mathematics*, in 1981 [11], and for the elaboration of the plan "Staying on Top: Winning the Job Wars of the Future", launched in 2004, aiming to create 100,000 Jobs in Triangle Region.

STP	**Technopolis Plc**., Finland [12]
Year of foundation	1982
Physical Base	Several science and technology parks and technology centers in Finland (Oulu, Helsinki-Vantaa, Espoo and Lappeenranta) and starting science parks and technology centers abroad.
Governance	Internal and Strategic Governance: Technopolis Plc, a private company, able to distribute dividends. The public sector and pension funds are among its main stakeholders.
Remarks on the Conceptual Framework	Technopolis was created in 1982, as a science park, the first of its kind in Scandinavia. The management institution became a private company. Nowadays, Technopolis Plc is the largest enterprise in Finland related to provision of operating environments for high tech companies. Technopolis Plc offers a comprehensive service package combining modern premises, business and individual services (including outsourcing), development programs and consultation. Technopolis Plc is becoming a key player, in Finland and abroad, concerning regional development programs based on spawning innovations and new businesses in order to improve economic growth and wellbeing.

Table 1 - continued

STP	**Sophia Antipolis** [13]
Year of foundation	1972
Physical Base	2.300 hectares used for the park through a French instrument [14] that allows urban development through an alliance of government, landlords, and other entities.
Governance	Several institutions are involved in the Internal and in the Strategic Governance, such as: Societé Anonime d'Économie Mixte Sophia Antipolis Côte d'Azur; Fondation Sophia Antipolis; Team Côte d'Azur; The Sophia Antipolis Urban Authority; Prefecture des Alpes-Maritimes; Interministerial co-ordination group for Sophia Antipolis; Alpes-Maritimes General Council; Riviera Resource Center; Syndicat Mixte Sophia Alpes-Maritimes (SAM) and Association Sophia Alpes-Maritimes Promotion.
Remarks on the Conceptual Framework	The roots of Sophia Antipolis are to be found in factors as: 1. The *French Decentralization Policy* carried out in the 60's [15], and 2. The perception of Senateur Pierre Laffitte concerning the possibilities of creating a *Quartier Latin* in the countryside and "the need of sociological approach to the land development in order to avoid the dispersion of the fragile *substantia grisea*, that requires a favorable cultural environment, a specific microclimate that almost always implies intellectual contacts and exchanges to maintain its creativity". Sophia Antipolis was proposed therefore as "a *Quartier Latin* in the countryside, a city devoted to creation, intelligence, and consequently to economic, cultural and social modernity" [16].

STP	**Technopole Toulouse Sud-Est, France** [17]
Year of foundation	1975
Physical Base	Three science parks and one business park, encompassing 1,000 hectares. The territory of the 36 municipalities is nearly 25,000 hectares.
Governance	The Internal and Strategic Governance is performed by SICOVAL, an institution formed by the 36 municipalities of the South-East Toulouse Conurbation Community.
Remarks on the Conceptual Framework	The *French Decentralization Policy* carried out in the 60's endowed Toulouse with a remarkable scientific, university and industrial complex, mainly in areas as aeronautics, space, electronics, information technology and health. In 1975, SICOVAL was founded by six municipalities, in South-east of Toulouse, as a kind of *consortium of municipalities*. The objective was to create a region agreeable to its inhabitants, attractive to business based on technology and environment friend, and avoid deleterious competition between neighbor municipalities. The adopted strategy was an inter-municipal cooperation, aiming at to exploit the strong points of the region and preserving the quality of life and of the environment. The proximity to the scientific, university and industrial complex of Toulouse strongly suggested the set up of a science park [18]. In 1980, for the first time in France, the municipalities decided to share, according to an ingenious system of redistribution, the resources derived from the business tax levied on the foresaw science park: *Labège Innopole*. The use of legal instruments related to the use of the soil allowed SICOVAL to set up this science park without any cost in financial terms to the municipalities and their inhabitants. Besides science and business parks management, SICOVAL provides other services to the region, as the formulation of regional strategic plans. In 1993, for example, the Conurbation Community, then with 33 municipalities, agreed to protect 13,000 out of their 23,000 hectares (i.e. 60% of the territory) from urban development, reserving that area for agriculture, forests, sports and leisure spaces, and natural grounds.

The analysis of Table 1 allows the proposition of the following statements concerning the subject addressed in this paper - the design of Science and Technology Parks:

1. The backgrounds, formats and purposes of the science parks around the world are quite different, as illustrated by comparisons between characteristics of some well-known parks:

    - *Stanford Research Park*, the first of its kind, has a single campus of 280 ha. Its management institution is a private company, focusing the real estate business and performing a weak Strategic Governance – if any. The remarkable innovation dynamic of the Silicon Valley possibly inhibited the development of such a function within the park management institution.

    - *Research Triangle Park* has a single campus of 3,000 hectares. The Research Triangle Park Foundation, the management institution, performs the Internal Governance and has an increasingly strong Strategic Governance role. The Foundation is becoming a major player in the formulation and implementation of North Carolina strategic planning.

    - *Toulouse South-east Technopole* is managed by SICOVAL, an institution formed by a community of 36 small municipalities, encompassing 23,000 hectares, in Toulouse periphery. SICOVAL is responsible for three successful science parks and one business district, occupying a total area of 1,000 ha. Besides the Internal Governance of the parks, SICOVAL performs an outstanding Strategic Governance, aiming at to prepare a community of 36 small municipalities to overcome the challenges brought up by the globalization of the economy within the Knowledge-based Society.

        A major outcome of SICOVAL, besides the science parks, is the preservation of nearly 60% of the territory of the Conurbation Community for agriculture, forests, sports, leisure and natural grounds, saving that area from urban development. It is important to emphasize that SICOVAL was born, in 1975, around the idea of congregating the municipalities to set up a science park, eventually created as *Labège Innopole* [(18)].

    - Technopolis, Finland, was created in 1982 as a science park. It evolved and became the manager of several science parks and regional development programs. Nowadays, as Technopolis Plc, it is the largest enterprise in Finland related to provision of operating environments for high tech companies. Moreover, it is becoming a key player, in Finland and abroad, on regional development programs related to spawning innovations and new businesses in order to improve economic growth and wellbeing.

    - The behavior of SICOVAL, Technopolis Plc and of many other science park management institutions indicates an extremely important emergent feature of science parks:

        Science and Technology Parks, as obstinate promoters of innovation in all sectors of activities, are becoming key players in the urgent search for the construction of a socially responsible development throughout the world.

2. In order to understand any STP, one must confront its characteristics against an adequate conceptual framework, since, as an old proverb says: *facts are important, but the reasons behind them are far more important than the facts themselves*.

3. Data about a STP – like dimension, number of tenants, generated jobs, master plan, management institution and best practices - are of course important. However, if the information is not supplied with a suitable description of the conceptual framework that grasps the circumstance in which the park is inserted, that data may be meaningless and misleading.

4. It is not an easy task to infer the conceptual framework of a STP counting only on information obtained in documents, Internet sites or even in a visit to the park. The practice of elaborating comprehensive conceptual framework, since the beginning of a STP project, should be enhanced.

5. The analysis and comparisons of STP conceptual frameworks – as illustrated in table 1 - lead to a better understanding of the definition of science park proposed by the IASP in 2002 [(5)]. According to this definition, a science park is not supposed to be a property-based venture any more. Actually, properties may belong to third parts and may be used for the park's purposes through agreements.

   Definition according to IASP International Board, 2002:

   A Science Park is an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions.

   To enable these goals to be met, a Science Park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities.

6. The concept of science parks is therefore evolving. As an educated guess, the next stage of the science park definition may be something like this:

   Science Park is a formal alliance of the public and private sectors that, through the systematic promotion of innovation and of knowledge-based enterprises, provides strong support to a regional development that is socially responsible and competitive in the worldwide arena.

III.2. Characteristics of the transition of paradigms

Our generation is living and acting in an extraordinary moment of the Human Epopee: a *transition of social paradigm*. Therefore, conceptual frameworks for science parks must take into account the lessons that can be learnt from *paradigm transitions*.

Comments about these transitions are presented herein [(2)]:

1. The *Industrial Society*, the era engendered by the Scientific Revolution (17th century) and the Enlightenment (18th century) is being worldwide replaced by a radically different era, the *Knowledge-based Society*, paved by the acceleration of the advancement of science and technology.

2. Each one of these eras is a *social paradigm*, understood as the *standard form* with which a society, in a certain moment of its history, *perceives the reality and responds to its challenges*.

3. A new paradigm provokes a break in the *status quo* that may create extraordinary opportunities for newcomers who are able to associate their creativeness to innovations or dominant factors in the new realities.

4. Efficient answers to challenges brought forth by a new paradigm do not come up from the concepts and instruments created under the aegis of the former paradigm, but from *new and revolutionary concepts and tools*, conceived and implemented within the new paradigm ambiance.

5. The creation and the development of those new concept and tools require *courage to challenge dogmas and consecrated behaviors*, and *intellectual boldness to dream beyond any limit*.

   In the transition from the Middle Ages to the Italian Renaissance, for example, it would have been useless for the copyists to despair because of the extinction of their jobs in consequence of the introduction of printing in Europe.

   It would have been equally useless to try to keep the moribund copyist's job artificially alive through new strategies, such as a *manuscript industry reengineering* (!).

   Only through a *paradigmal leap* into the new social paradigm, the Renaissance, which was offering immense employment opportunities in the newborn printing industry and in the emerging process of universal elementary education, could copyists have expected to solve their unemployment problems.

6. It is very difficult for people and institutions that were educated under a certain paradigm to perceive the advent of a new paradigm and to move on to it.

   The case of the integrated circuits is eloquent. Though they were the heirs of the electron tubes, the tube makers were not able to transform themselves into successful makers of integrated circuits, allowing the market for this new product to be dominated by companies created within the new technology environment.

7. A new paradigm creates *new entities*, which are often designated by neologisms since the corresponding concept had no previous existence. These new entities can only be understood and developed within the environment of the new paradigm to which they belong to.

   While a *television network* is an entity of the Industrial Society, the *cyberspace* is an entity of the new paradigm, the Knowledge-based Society.

8. It is impossible, in the environment of the old paradigm, to solve the problems brought forth by the new paradigm.

   The case of the copyists trying to save their jobs through the manuscript industry reengineering is an eloquent metaphor to illustrate this point.

Therefore, since we are living in a new paradigm, a science park **must be conceived as *an entity of this new paradigm***, and not as an entity of the former paradigm. A consistent analysis of the comparison of the characteristics of these two paradigms (table 2) may suggest a series of attributes a science park must display as an entity of the *Knowledge (global-based) Society*.

III.3. Characteristics of the Knowledge-based Society

Table 2 illustrates a comparison between Industrial Society and *Knowledge-based Society*. [1 and 2]

Aspect	Industrial Society	*Knowledge (global-based) Society*.
Market	Domestic markets, expanded through wars.	Global market, expected to be regulated through international treaties.
Nation competitiveness	Cheap labor, natural resources, capital etc.	Education of the people and their capacity for generating and using knowledge and innovations.
Main economic sectors (production of goods and rendering of services)	Chemicals; Automobile industry; Electronics; Civil Engineering; Agribusiness; Pharmaceutical; Information Technology; Telecommunications.	Though many economic sectors of the Industrial Society will remain important in the Knowledge-based Society, **promising new sectors will emerge from the conjugation of several activities and technologies**, such as: 1. *Humanware*: the synergy of activities related to education, culture, leisure, sports, health care, arts and modern technologies, such as *Ecotourism*. 2. *The convergence of Information Technology, Communications and Information Content*, based on technologies such as personal supercomputers, nanoelectronics, fiber optics, photonics, wireless communications and image processing. 3. *Health care*: based on technologies such as biotechnology, information and communications technology, image processing, nanotechnology, robotics, medicine and pharmaceutics. 4. *Agribusiness*: based on technologies such as biotechnology, information and communications technology, image processing, and advanced logistics. 5. *Knowledge Engineering*: the synergy of different specializations aiming at solving the increasingly complex problems created by new realities.
Political models	Centralized government. Representative democracy. Nation-state.	Decentralized government. Participative democracy, including online optoelectronic interaction between government and citizens. *Virtual Region-states* within *Nation Communities*.
Government	1. Strong intervention in the economy and other fields. 2. Autarchic action. 3. Planning oriented to economic aspects.	1. More regulatory and less executive. 2. Alliances of public and private sectors. 3. Promotion of strategic planning toward global socially responsible development processes.
Environment	Irresponsible use of natural resources.	1. Ecological awareness. 2. International regulations on environment.
Industry and service companies	▪ Vertical production. ▪ Strong hierarchy. ▪ Multinational companies. ▪ Local innovation clusters	▪ Horizontal production chains. ▪ Horizontal teams. ▪ Integration to worldwide production and innovation system. ▪ Transnational companies. ▪ Global innovation system.
Approaches	▪ Fragmentation of the knowledge. ▪ Little interaction between specializations.	▪ Multidisciplinary approaches. ▪ Synergy between institutions and specializations. ▪ Strong networking.
Information Infrastructure	▪ Few local TV channels and newspapers. ▪ Limited access to telecommunication services.	▪ Optoelectronic interactive worldwide networks, with virtually unlimited number of channels. ▪ Easy access to global telecommunication services. ▪ Easy access to interactive global data bank services.

The advent of the *Knowledge (global-based) Society* brings extraordinary challenges - threats and opportunities - to every enterprise and community. These challenges include blessing elements - as the educational possibilities of Internet, as well as alarming elements - as the soaring rate of environment destruction, unemployment, and urban violence.

Therefore, the Strategic Governance of a science park must stimulate universities, research centers, government and enterprises to get together in order to create and implement responses to overcome threats and take advantage of the opportunities offered by the new era.

> Good examples of this kind of action are offered by the Research Triangle Park Foundation, becoming a major player in North Carolina strategic planning [(10)], and SICOVAL, preparing a community of 36 small municipalities to be successful in the *Knowledge (global-based) Society* [(16)].

III.4. Philosophy of the development process desired by the community

The *Methodology of Innovative Regional Development* [(2)] advocates, in the case of Brazil and other South American countries, that the regional development process must simultaneously be: democratic; socially fair; ethical; environmentally sustained; demographically sustained; promoter of high quality of life; promoter of local, regional and national culture and values; competitive in the global economy of the Knowledge-based Society; promoter of self-esteem of the population; and integrated to the collective imaginary.

Each of these attributes opens, by itself, a world of possibilities. For example, the promotion of local culture may enhance the local production of educational and leisure audiovisual programs, which can foster a great number of candidates for a science park.

III.5. Context analysis

The context analysis of local, national and international level is a paramount activity for STP design. That activity is well treated in the literature. The only remark about the subject is that the design of a STP can not be a prisoner of that kind of analysis. Other *intellectual inspiration springs* must be taken into account, as suggested in this paper.

III.6. Special studies

Example of other aspects that may have significant impact on STPs are:

1. The conditions for the existence of fruitful synergies within the park ambiance.

   > If a science park is supposed to promote synergy of tenants and other innovation agents, the layout and the elements of the park must propitiate that function. A conviviality center - a kind of a modern *agora*, where the *citizens of the innovation* can get together and exchange ideas - must be provided.

2. The possibilities of work, education and leisure through the web and the *dematerialization* of traditional downtown functions - at least in many developing countries, and the availability of low priced office space in that once privileged urban area.

   > In some towns, the historical downtown may be transformed in a notable science and technology park. In that area a sound infrastructure and reasonable priced office space may be available. The *Porto Digital Science Park*, in Recife, Brazil [(19)] is a good example of this approach. Other example of the use of downtown as an innovation cluster is the *quartier Saint-Roch*, in Quebec City, Canada. This historic quarter has been restored and was able to attract university unities and dozens of IT companies and artists. It even has a business incubator for the arts: *Le Complexe Méduse* [(20)]. Nowadays the *quartier Saint-Roch* may be seen as a *non-formal urban science park*, centered in arts and in the Information and Communications Technology Sector [(21)].

IV. Conclusions

1. In order to be successful in the *Knowledge (global-based) Society* a Science and Technology Park must be conceived, planned, evaluated and continuously upgraded according to a correct *conceptual framework* and an adequate *set of directives*.

2. The creation of the conceptual framework and the set of directives requires a multidisciplinary team - including philosophers - able to identify, analyze and join together several *intellectual inspiring springs*, as local context analysis, lessons from the worldwide network of science parks, characteristics of paradigm transitions, the *Knowledge (global-based) Society* opportunities, and the philosophy (and ethical values) of the desired regional development.

3. If a Science and Technology Park is designed without a clear and adequate conceptual framework, and without a suitable set of directives, the park will be condemned to a mediocre performance and a short life - if any - in the *Knowledge (global-based) Society*.

4. The behavior of many science park management institutions, and their remarkable results, indicate an extremely important emergent feature:

   Science and Technology Parks may be one of the most significant instruments that our society may dispose, at the time being, in order to promote a worldwide socially responsible development.

5. It is therefore necessary to continue to update the science park concept, as IASP has been doing in the last years, in order to encompass the increasingly large and complex spectrum of STPs that are blooming worldwide. Possibly, the next stage of the definition will be:

   Science Park is a formal alliance of the public and private sectors that, through the systematic promotion of innovation and of knowledge-based enterprises, provides strong support to a regional development that is <u>socially responsible</u> and <u>competitive in the worldwide arena</u>.

   This concept emphasizes that a Science and Technology Park encompasses experiences as different as, for example:

   - University Research Parks, as *Stanford Research Park* and *Rio Grande do Sul Catholic University Science Park*, Porto Alegre, Brazil [(22)].
   - Technology Parks out of university campi, as *Labège Innopole*, South-east Toulouse; *Innopoli*, Otaniemi, Finland; *Parque Capital Digital*, Brasília, and *Sinos Valley Technology Park*, Campo Bom, Brazil [(23)].
   - Technology Parks disseminated in the urban texture, as *Porto Digital*, Recife.
   - Organizations and companies in charge of the management of several science parks and business incubators, as well as of regional innovative development programs, such as SICOVAL, Technopolis Plc, Fundação CERTI, Brazil [(24)] and many other *technopolitan system* institutions.
   - *Proto-science parks*, as the innovation cluster of *quartier Saint-Roch*, Quebec City.

6. The systematic updating of science park concept is vital to insure that the institutions in charge of science parks and of regional innovative development processes will continue to considerer IASP as an adequate forum to get together and exchange ideas and experiences.

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