THE STRATEGIGRAM – DEVELOPMENT AND CRITICAL ANALYSIS

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ABSTRACT

This study participates to the development process of an instrument called Strategigram. The creator of this instrument - the General Manager of the International Association of Science Parks (IASP), Luis Sanz – wants to create a new and more comprehensive way to analyse and examine science parks. The IASP and Luis Sanz aim at developing a method that is at the same time – unlike the prior research – applicable around the world, to a number of science park models and includes more than just one or two elements. The Strategigram examines different strategic approaches and creates each science park a profile with respect to such strategic issues as the target markets, target companies and the degree of specialisation.

This study examines seven strategic axes of the Strategigram. The indicators and weights used on each respective axis are examined to a limited degree. The main objectives of this work are to give proposals concerning the seven axes, detect latent defects, study perceptions of the science park managers and to come up with improvement proposals concerning the Strategigram as a service for the member parks of the IASP.

A pilot test of eleven science parks is conducted. The primary sources of information in this study include questionnaires – used mainly for creating a profile for each park - and interviews of the science park managers. One of the main analyses used in this work is comparing the self-perceptions of the science park managers to the Strategigram profiles.

It is found out that multi-site science parks and networked management models do not fit the Strategigram as such. It is recommended that each site of the park should be examined alone and given its own profile. On the Target Companies axis, it is found out that the instrument does not take into account New Technology Based Firms that are not part of any incubator. An indicator that takes into account these companies is recommended to be added to the criteria. On the Target Markets axis, it is recommended that the axis should reflect more the present state of the park instead of the objectives of the park. In addition, Minor changes to the weights of those axes that do not pose any bigger problems are recommended.

KEYWORDS: Science Park, Technology Park, Research Park, Strategigram, IASP, International Association of Science Parks

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TIIVISTELMÄ

Tämän tutkimuksen tarkoituksena on osallistua Strategigram instrumentin kehittämiseen. Instrumentin kehittäjä International Association of Science Parks:n (IASP) toimitusjohtaja Luis Sanz haluaa luoda uuden tavan analysoida ja tutkia tiede- ja teknologiapuistoja. IASP:n ja Luis Sanzin tarkoituksena on kehittää aiempaa kattavampi metodi, jota voitaisiin soveltaa useimpien tiedepuistojen osalta kaikkialla maailmassa. Strategigramilla voidaan luoda jokaiselle tiedepuistolle oma profiili strategisten suuntausten perusteella. Akseleilla tutkitaan mm. puiston kohdemarkkinoita, kohdeyrityksiä ja erikoistumista.

Tämä opinnäytetyö analysoi Strategigramin seitsemää strategista akselia. Metodissa käytetyt indikaattorit ja niiden painotukset analysoidaan rajoitettuun pisteeseen saakka. Tämän opinnäytetyön päätavoitteita ovat ehdotuksien antaminen koskien seitsemää akselia, piilevien vikojen löytäminen, tiedepuistojohtajien mielipiteitten kartoitus ja metodin kehittäminen palveluna IASP:n jäsenpuistoja varten.

Tämä opinnäytetyö sisältää pilottitutkimuksen, jonka kohderyhmänä on yksitoista tiede- ja teknologiapuistoa. Tärkeimpiä tiedonlähteitä ovat olleet profiilin luomiseen tähtäävät kyselyt sekä tiedepuistojohtajien haastattelut. Yksi tärkeimmistä analysointitavoista on johtajien omien näkemyksien ja Strategigram-profiilien vertailu.

Tutkimuksessa todetaan, että puistot joilla on useampi kuin yksi sijainti tai verkottunut hallintamalli, eivät sovellu sellaisinaan Strategigramiin. Puistoja ehdotetaan tutkittavan vain yksi sijainti kerrallaan ja jokaiselle sijainnille tulisi antaa oma profiilinsa. Kohdeyritysakselilla todetaan, että instrumentti ei huomioi nuoria teknologiapainotteisia yrityksiä, jotka eivät kuulu yhteenkään yrityshautomoon. Tutkimuksessa suositellaan indikaattoria, joka ottaisi huomioon nämä nuoret yritykset. Kohdemarkkina-akselilla suositellaan, että akselin pitäisi pohjautua enemmän puiston todelliseen tilaan kuin tavoitteisiin. Niille akseleille, joilla ei ole suuria vikoja, ehdotetaan pieniä muutoksia painotuksiin.

AVAINSANAT: Tiedepuisto, teknologiapuisto, Strategigram, IASP, Internatioanl Association of Science Parks

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1 INTRODUCTION

The International Association of Science Parks defines a science park in the following way in its official definition: "*A Science Park is an organisation managed by specialised 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.*" (IASP, 2002, 3.)

The origin of the science parks dates back to the 1950s. The first science parks emerged in the United States and they were mainly university initiatives. The first science park, the Stanford Research Park, was created because of the financial problems of the university, on the one hand, and because of the need of the companies near-by for industrial land, on the other. The university had land but they were not permitted to sell the land and therefore they gave long-term leases to the local companies and even let them build their own buildings subject to their own approval of the plans. In other words, the universities were capitalising their unused land. (Stanford University, 2006.) The companies also agreed to employ the students. Soon they realised that the concept was good and the financial problems of the Stanford University were gone as the electronics industry started to expand. This region is nowadays known as the Silicon Valley. (UNESCO, 2006a)

The first science parks were university science parks that were concentrated on capitalising land and research results. The number of science parks began to increase slowly and the real boom started in the 1980s when the past experiences encouraged the governments to use science parks as tools for regional development. (Zhang 2002, 22.)

Haxton and McQueen (1998; Haxton 2000) estimated that by the end of the 1960s the number of science parks worldwide amounted only to 21 parks. However, after the substantial growth of the science park phenomenon in the 1980s, the number of science parks had increased to 270 parks by 1990 and to nearly 900 by 2000. (Zhang, 2002, 138-139.)

Universities and governments continue to be strongly involved with the present science parks. As already in the 1980s, science parks are still widely used for regional development as well as promoting other social purposes, such as employment and social stability. Yet, many science parks are completely privately owned and some may even be listed in the stock market.

Since its emergence, the science park concept has evolved tremendously. In addition to the activities mentioned in the example above, science parks are often offering their tenant companies a number value-adding services, such as, incubation services, financing, mentoring, training, legal advising and management services, just to mention a few. (IASP general survey 2006.)

Nowadays, the number of different kind of science park models is huge. For instance, some parks may foster only a few technology sectors whereas others may allow any kind of activities of their tenant companies. Some parks may emphasise the importance of knowledge and have close cooperation with the local universities and research institutes whereas others may be more concerned about the markets - not having that many connections to universities.

The abundance of different kind of science park models has led to several attempts to classify science parks. Such terms as Technology Park, Research Park, Technopole and Science City – just to mention a few – derive from such attempts. (Sanz 2006) Nevertheless, this study uses the terms "*Science Park"* as a generic term referring to all the existing science park models. In addition, the term "*Science and Technology Park*" (STP) - having the same meaning - is used.

Luis Sanz, the Director General of the International Association of Science Parks is developing a method to classify science parks worldwide according to their

strategies. The method is to be used as an extra service for the members of the IASP. The service offers the member science parks the possibility to examine the profiles of the other member parks. These profiles contain information about the park's strategic approach to such things as the target markets, networking and management model. This study takes part to the development process by conducting a pilot test which has a global sample group of eleven science parks.

The International Association of Science Parks, later on referred as the IASP, is a worldwide organisation for science parks. It was founded is 1981. It is a non-profit, but financially self-sufficient organisation, consisting of more than three hundred members (309 members on March 2006) from more than sixty countries (64 on March 2006) different countries amounting to 70000 companies. Most of the members are science parks but there are many business incubators and other organisations that share at least some of the objectives of the IASP as members. The main aims of the organisation are to assist the development of science parks, promote closer cooperation among science parks and business incubators and to foster international networking among its members.
(IASP Presentation 2006)

1.1 The Strategigram

The Strategigram is based on the idea of the Director General of the International Association of Science Parks, Luis Sanz, to develop a method to better describe the numerous science park models. The Strategigram was first introduced to the public, shortly after being invented, in the IASP Latin American Conference in 2005 in Buenos Aires, Argentina. The progress of the Strategigram development process has been reported in several other IASP conferences – the latest one being the XXIII IASP World Conference on Science and Technology Parks in Helsinki June 2006. (Sanz, 11.8.2006.)

The Strategigram deals with the scarcity of resources. No science park has unlimited resources and thus, the managers of those parks are forced to make choices. The essential idea is to take a look at the present state of the park

concerning seven strategic issues. All the seven strategic issues represent one axis. These axes are:

- Location and Environment
- Position in the Technology Stream
- Target Companies
- Degree of Specialisation
- Target Markets
- Networking
- Management model

Each respective axis corresponds to a certain strategic issue. One axis comprises of several questions that are used for defining one's position in the axis in question. Each question has a predetermined value that defines how much each question affects to the park's position on one specific axis.

Each axis has a spectrum of possibilities that are not mutually exclusive. In other words, being on the other extreme of one axis does not imply that the other extreme would be excluded in the activities of the park. The Strategigram creates a profile of the science park that shows what the park emphasises the most at the time of the assessment.

It is important to highlight, that the Strategigram does not aim at measuring the performance or the outputs of the park but describes the park. The Strategigram reflects the current state of the park that can be the result of several strategic decisions or coincidences.

Luis Sanz states several potential uses for the Strategigram whose primary target audience is the science park managers. He states as the main objective best practise benchmarking. Of course, as the Strategigram does not indicate whether a park is successful or not, the criteria for defining a successful science park must come from somewhere else. What the Strategigram does allow is to scrutinise different science park models. Comparing the profiles of successful and less successful science parks, the good practices of successful science parks can be

imitated. The Strategigram can also be used for the self-evaluation of a science park. When running their parks the managers may not have enough time to stop and see the direction of the organisation they run. The Strategigram gives the possibility to do this. The science park managers can see the evolution of their park easily by comparing its present and previous profiles. It can also help the process of establishing a new science park. Good practices and experiences achieved somewhere may be applied somewhere else subject to similar socio-economic conditions.

1.2 Problem Statement and Limitations

This study aims at modifying a survey instrument that is used for describing different science park models according to their strategic approaches. During this process, the seven strategic axes are tested and critically analysed to a limited degree. The aim is to come up with recommendations concerning the seven axes, the used indicators and their weights and the whole method in general.

The aim is that the science park managers recognise their own park in the Strategigram profile and accept it. How could the respondents trust this instrument if it does not give a realistic picture of their own park? If the Strategigram does not arouse enough interest, no database of different profiles can be gathered, as the science park managers will not be too eager to answer the questions needed for creating the profiles.

Moderate differences in the managers' own views and the Strategigram profiles are expected and accepted. The reasons behind the biggest contradictions between the Strategigram profiles and the self-evaluations are examined. Suggestions for avoiding these contradictions are made. It is acknowledged that each science park manager is likely to have his or her own view of the definitions and terms used in the Strategigram. Thus, the main concern is to reduce the misunderstandings. Proposals are made in order to converge the gap between the profiles and the self-evaluations of the science park managers. This study does not analyse the order of the axis or the two extremes of the axes.

The author acknowledges that there is conflict between suggesting that Strategigram does not measure anything while pointing out that the instrument can be used for benchmarking. However, Sanz claims that applying the Strategigram to best practise benchmarking is one of the main functions of the instrument. Therefore, the author ignores this conflict and explores these possibilities in section 6.6.

1.3 Methodology

This study is based on exploratory research and is highly descriptive in nature. The opinions of the science park managers and other experts are in crucial position throughout the research process.

The primary sources of information include questionnaires and interviews. The questionnaire (APPENDIX 1) consists of two separate sections. The IASP has constructed the first section concerning the information required for creating the Strategigram profiles. This section contains basic information about the Strategigram and thus is used as one of the sources. The other section, constructed by the author, gives the STP managers the possibility to evaluate their own position on each axis. In order to make this task easier for them, the questionnaires include a short introduction of the nature of each axis provided by the IASP. After the self-evaluation on each axis the respondents are given the possibility to make some additional comments. Moreover, the managers are asked to evaluate the importance of each axes and the importance of the whole method as one entity.

The primary sources of information include both face-to-face interviews and telephone interviews. The main purpose of the face-to-face interviews is to introduce the author to the subject and collect background information about science parks and the science park phenomenon in general. Valuable information about the perceptions of the interviewees about the Strategigram is collected. The respondents of four science parks – out of the eleven sample group parks – are

interviewed. The first one of these interviews is carried out face-to-face and the rest of interviews are conducted over the phone.

The secondary sources of information include the tacit knowledge of the author from doing the practical training at the IASP headquarters and a vast amount of literature and previous studies on related subjects as well as a number of academic and conference papers concerning science parks. The author has a basic understanding of the science park phenomenon. Yet, the author relies heavily on the information acquired from the questionnaires and the interviews. Before the actual research process, some interviews were conducted in order to familiarise the author with the science park phenomenon. Lauri ylöstalo from Lahti Science Park, Tomi Tura from University of Helsinki and Vesa Harmaakorpi from Lappeenranta University of Technology were interviewed.

The sampling in this study is done arbitrarily. Part of the used sample group is chosen by the author and part of the parks by the IASP. The parks are selected so that they would represent a number of different kinds of STP models and parks from different regions and socio-economic conditions. Section 6.9, in the end of this study, discusses the used sample group and the validity of the results.

The Strategigram profiles are compared to the own perceptions of the science parks managers. If a self-evaluation differs considerably from the Strategigram profile the answers of the respondent in question are checked from the questionnaire. If the answers clearly show that the Strategigram profile corresponds to reality and the respondent of that particular park has not written any additional comments concerning that axis the self-evaluation is ignored. The proposals are mainly based on the data gathered from the questionnaires and the four interviews conducted.

1.4 Structure

The theory part of this study introduces the reader to the science park phenomenon. The reader is given the needed information that is needed for

understanding this study, yet not going into too much detail. The composition of the Strategigram is introduced very briefly. In addition, the theory part discusses the origin of the Strategigram. Next, the seven axes that comprise the Strategigram are analysed and the whole instrument in general is examined. Finally, the last section concludes how the Strategigram could be developed.

2 THE SCIENCE PARK PHENOMENON

The introduction section discussed the emergence of science parks. It was said that the first science parks were mainly university initiatives and the governments started to promote science parks in the 1980s. This chapter discusses in more detail the interrelations between the government, the university and the industry. Moreover, this chapter aims at giving the reader a better understanding of the science park phenomenon. The reader is given sufficient amount of information about science parks in order to be able to follow the research project without any major difficulties.

Luis Sanz lists the following elements as the building blocks of a STP:

- Management
- Knowledge sources
- Value-added services
- Quality space
- Creation of New Technology Based Firms (NTBF)
- Marketing
- Networks
- Local/ regional impact

(Sanz 2005a.)

Sanz considers these factors as an important part of science parks and has based his Strategigram model on them. This chapter discusses briefly some the "building blocks". Moreover, some additional themes closely related to science parks are discussed.

2.1 Quality Space

The introduction chapter already mentioned that the first science park, the Stanford Research Park, was mainly a property-based initiative. The tenant companies together with the suitable facilities created the foundation for the science park. The interaction between the university and the industry was rather trivial compared to the present science parks although advanced in the 1960s.

Rowe argues that evolution applies to science parks too. He states that many science parks in the 1980s started their activities by concentrating fully on creating infrastructure and buildings, giving much less emphasis on their other activities and services. However, he continues that the most successful old science parks have changed their strategy over the years. During the 1990s the most adventurous science parks shifted their emphasis to technology transfer, incubation and other more intellectual activities. The park managers understood that mere infrastructure and buildings were not enough and they had to become active players. The combined skills of property development, business development and technology transfer allowed the leading science parks to advance the economic development on local and regional levels. Rowe sees the physical aspects of the park as the foundation of the park. He claims that it is the first step – and an important one - in the development process of a science park (2002, 287-288.)

A survey conducted by the IASP in 2006 examined the sources of income of science parks, among other things. The survey consisted of 79 member parks of the IASP around the world. One section of the study examined the sources of income of the parks. The section included such sources as: property rental income, property sales income, tenant fees, services provision and different levels of public sector support. The results suggested that rental income is still a substantial source of income for many science parks whereas the importance of property sales is much less. TABLE 1 shows the results concerning the property sales income. The biggest share in each respective category has been written in bold letters.

TABLE 1. STP Sources of Funding (IASP general survey 2006)

	Property rental income	**Property sales income**
N/A	15% (12 / 79)	28% (22 / 79)
Not contributing	18% (14 / 79)	**44%** (35 / 79)
Lowest contribution	6% (5 / 79)	4% (3 / 79)
Moderate contribution	20% (16 / 79)	8% (6 / 79)
High contribution	15% (12 / 79)	13% (10 / 79)
Highest contribution	**25%** (20 / 79)	4% (3 / 79)

2.2 Tenant Companies

"In some way STPs must act as – among other things – the guiding light for the companies and economies in the regions they serve, facilitating their well-planned and well-organised entry into the Information Society (Sanz 1998, 317.)"

Without the tenant companies, science parks would not exist. Sanz states that the STPs must always be in the front line of many changes and advantages and help their tenant companies to position in line with or within the latest technology and management methods and the demanding markets (Sanz 1998, 317.)

The general survey of 79 STPs conducted by the IASP in 2006 indicated that the quality of the tenant companies is very important for many science parks, although not always. TABLE 2 reveals how important the 79 surveyed parks considered the quality of the tenant companies. The majority of the parks considered the quality of the tenant companies quite important but it is interesting to see that this was not the case with all the parks.

TABLE 2. The importance of the quality of the tenant firms (IASP general survey 2006)

Quality of tenant firms	
N/A	19% (15 / 79)
No importance	0% (0 / 79)
Low importance	6% (5 / 79)
Medium importance	32% (25 / 79)
High importance	**43%** (34 / 79)

2.3 Management

Tidd, Bessant and Pavit divide the success factors for innovation into two groups: technical resources (people, equipment, knowledge, money, etc.) and capabilities in the organisation to manage them. They acknowledge the difficult nature of innovation business but argue that majority of failures in innovation business are due to some weakness in the managing process. (2001, 142) Formica claims that the success of a STP depends on two things: the quality of the actual operations and the management (2000, 1).

These were only a few examples of how the management of a science park is given much emphasis when speaking of the success factors of science parks. The management issues of STPs are a complicated matter but are not a prerequisite for understanding this study. Thus, the management issues are not examined further. However, something that is clearly connected to the management of a science park - the STP ownership structure - is discussed in the following sections more accurately.

2.4 Creation of NTBFs

Incubation and fostering New Technology Based Firms is very common among all the science parks worldwide. Incubation means that a park has at least one incubator that nurtures young firms during their start up period. The incubators

provide the companies such thing as management assistance, access to financing, suitable facilities and flexible leases. The main goal is that eventually the companies leave the program financially viable and freestanding. (National Business Incubation Association.) Lalkaka points out that the majority of incubators in both developed and developing countries operate on a non-profit basis and have economic development goals as the main mission. Such incubators receive their funding from rentals and services as well as in the form of subsidies. (Lalkaka, 2002, 185.)

The General survey of the IASP revealed that only 10% of the respondents did not offer any incubation services whereas 78% of the respondents did have at least some kind of business incubation activities - the rest 12% of the answers not being valid (IASP general survey 2006.)

2.5 The Three Sides Participation Theory

Many science park definitions include the regional development and technology transfer as some of the most important missions of the park - technology transfer referring to a process where technology, knowledge or information developed somewhere, by someone or for some purpose is transferred to someone else, somewhere else or for some other purpose (IASP Definitions, 2006). For instance, Zhang noticed that the different definitions for the most common science park models given by the International Association of Science Parks (IASP) and the Association of University Related Research Parks (AURP) shared all some similar characteristics. The parks were defined as property-based schemes that assist the growth of knowledge-based firms and technology transfer by bridging higher education and research institutions and industries. (2002)

It is required the three parties – namely, the university, the government and the industry – to work together in order to succeed and achieve these goals. All the three parties have something to give and something to benefit from the cooperation. Naturally, all the three parties have different expectations for their inputs. (Jisong 1998, 343.)

The Three Sides Participation Theory describes the benefits of the government, the university and the industry working together. Normally, the science park and the tenant companies within the park develop and commercialise new technologies with close cooperation with a university. This creates employment and other social benefits in local and regional levels. The responsibility of the government is to support and coordinate the interests of the science park and the university. In return, the government gets social stability and receives revenue from taxes created by the enterprises. In addition, this close cooperation converges the gap between the educational circles and the working life and makes the university more attractive from the students' point of view. The cooperation benefits all the three parties and creates synergy benefits (Jisong 1998, 343.)

Lex de Lange argues that the so called Poldermodel - the private and public sector working side by side - is in crucial position in the economic development projects of the government. The participation of the government and its financial and non-financial aids enable many science parks to act without any major financial pressures. Many STPs have started as government regional development projects and then become purely commercial and profit-oriented organisations. (1998, 127-131.)

2.6 STP as a service provider

Normally, science parks offers their tenant companies a number of value-adding services. The IASP general survey of science parks in 2006 suggested that the most common services include such services as: availability of seed capital funding, banking services, intellectual property consulting, management support services, ready networks and training. The majority of the parks had outsourced part of the services (67%) whereas only small proportion of the parks had either delivered the services wholly in-house (14%) or outsourced them completely (6%, the share of not valid answers being 13%). (IASP general survey 2006.) The TABLE 3 shows that the majority of the surveyed parks did not consider services as an important source of income.

TABLE 3. Service Provision as a Source of Income (IASP general survey 2006)

Services provision:	
N/A	16% (13 / 79)
Not contributing	9% (7 / 79)
Lowest contribution	**28%** (22 / 79)
Moderate contribution	25% (20 / 79)
High contribution	16% (13 / 79)
Highest contribution	5% (4 / 79)

2.7 Networking

The managers of the present science parks have much more to worry about than their colleagues few decades ago. The mere infrastructure and buildings are not enough anymore and the present science parks are much more complex entities (Rowe, 2002, 287). The science park managers must be alert at all times in order to be in the front line of the latest technology and trends (Sanz, 1998, 317). In order to play a key role in generating, transferring, diffusing and using knowledge, the science park managers must pay attention to networking activities between companies, research institutes, scientific and technical services and between the science parks themselves (Bellavista, 2002, 257).

Baker claims that the rise of the new knowledge-based economies, new technologies and globalisation among other things has set new requirements for organisations (1994, 8). Running a company or an organisation cannot be anymore a mere set of impersonal and technical tasks (Baker 1994, 33). Fast, flexible, innovative network organisations are required in order to succeed. The old role of a manager as a controller, boss and intimidator is becoming too a restricted role and a manager should be seen as an inspirer, coach and enabler. (Baker 1994, 8.)

The prescribed relations, such as the organisation charts or input-output tables, form the formal part of the network of the relationships of an organisation. However, one should not forget the informal ties. The informal ties may be based

on friend, advice or conversational relationships within and across the boundaries of the formal network. Moreover, the environment of an organisation should be seen as a network of other organisations. (Nohria & Eccles 1992, 5.) Granovetter shares this view of the benefits of informal connections. His famous theory from 1973 about the strength of weak ties suggests that weak ties in social networks are the most beneficial ones and that the stronger ties have nothing new to offer (Granovetter 1973, 1360-1380).

The typical formal networking activities of a STP include hosting and attending conferences, strategic alliances, attending to networks and making cooperation agreements with universities and research institutes and other science parks.

3 COMPOSITION OF THE STRATEGIGRAM

3.1 Creating a Profile Based on Strategy

The axes, their criteria and the weights used are based on the long working history with science parks of Luis Sanz. Sanz believes that taking a look at the strategy of a science park is unavoidable in order to achieve a comprehensive and meaningful method to examine science parks. He has three main objectives for the Strategigram:

- Providing an effective tool for benchmarking.
- Self-assessment
- Providing information for establishing a new science park

(Sanz 2005c.)

The method used takes a look at seven separate strategic questions. Each strategic issue represents one axis in the Strategigram and has two extremes and an equilibrium point which reflects a perfect balance between these two extremes. Each axis represents a spectrum of possibilities. The choices on one axis are not mutually exclusive. Where the park is positioned depends on what the park emphasises the most. Emphasising something does not automatically exclude

other activities but shows the allocation of the limited resources of the park. All the different answering options have a predetermined value that affects the park's position on one particular axis. The park is calculated a score in scale from (–10) to (+10) for each respective axis. The weights have been designed so that the scores representing the park's position on each axis cannot exceed the values (-10) and (+10) although the score may be anything between these two numbers. When the profile is drawn, the score is rounded to the closest integer.

When a park is created a profile the starting point is that the park is positioned on the equilibrium point on each axis. The managers of the park in question are asked a set of questions concerning all the axes. Each answer affects the park's position in one of these axes in a way or another. Depending on the answer the position may move closer to either one of the two extremes or stay in place. The questions asked form the criteria within the axes whereas the amount of the effect that each answer results corresponds to the weight of the criteria. For instance, on the Target Tenant Companies axis the managers are asked the number of incubators in the park. If the park does not have any incubators the position of the park on that axis moves strongly towards the Mature Firms extreme. If the park has one or more incubators the park's position moves towards the New Technology Based Firms extreme a certain distance depending on the amount of the incubators.

Defining the right criteria for each axis and the right weight for each answer is one of the aims of this study. The goal is that the profile of the park would correspond to the reality. What makes the task more difficult is defining what the reality is. The author considers the reality as something that derives from the views of the science park managers yet keeping in mind the facts and figures concerning their park. It must be kept in mind that the backgrounds that the managers have are likely to affect the way they see their own park.

The score itself does not imply anything positive or negative. Each axis has two extremes that reflect opposite strategic approaches to a certain strategic issue. The axes and the two extremes within the axes are based on arbitrary decisions. The score simply refers to either one of the two extremes of the axis. Zero stands for

equilibrium between the two extremes. For instance, a park having a score (–2) on the Target Firms axis implies that the park in question is concentrated more on incubation and new companies than mature companies. This is not a positive or negative aspect but a strategic choice of the management team. Nor does this mean that the park would not promote mature companies. The Strategigram does not pay any special attention to the sides of the extremes. In other words, why one extreme has been put on the minus side and the other one on the plus side, is not relevant in this method. (Sanz 2005c.) Nevertheless, the author wants to point out that the negative extremes on the Technology Stream, Target Firms and Governance axes tend to be more knowledge and university based.

3.2 Graphical Representation and Interpretation

After all the axes have been given a score, a graphical representation of the profile of the park can be drawn. Each axis is drawn a spot according to the score on the scale from (–10) to (+10). The score may include decimals but they are rounded to integers before setting the spots on the axes. When each respective axis has a spot, a curve that links all the spots, is drawn. The curve reflects the profile of the park. (Sanz 2005c.) The FIGURE 1 shows, how the profile of a park looks.

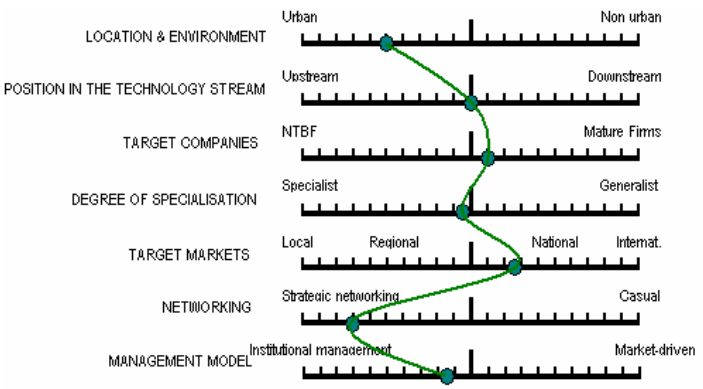

FIGURE 1. An example of a Strategigram profile.

Although the graphical representation does not contain more information than the scores themselves, it makes comparing the parks easier. One can see a park as one entity instead of examining each respective axis separately. For example, by taking a look at several profiles at the same time, one may find similar patterns that parks in certain regions or countries have. Moreover, it facilitates examining the interrelations between two or more axes. For instance, urban location is likely to correlate with parks that have close cooperation with universities. What other possible correlations the Strategigram may reveal is yet to be studied. Nevertheless, this study concentrates more on the development process of the Strategigram.

3.3 Conscious Decisions

What is common for all the axes is that the management must be able to change their position on each axis. In other words, the features examined are not static and can be changed. In that respect the first axis differs from the other axes as the location of the park is not likely change. Yet, the science park managers can make the park area more attractive for the workers by constructing housing zones and by supporting and offering such services as sport centres, libraries, shops, child care and health care. In addition, the population of a city is not a static feature and is probably growing all the time. (Sanz 2005c.)

The ideal situation would be that the present state of the park would be the result of the conscious decisions of the management team. However, this is not always the case. A park may end up, for example, promoting certain technology sectors by chance. Was the present state of the park the result of conscious decisions or chance, the profile of the park is always the same. (Sanz 2005c.)

Sanz describes the nature of the axes in the following way:

- They call for a conscious decision of the management team of the STP
- The effects are normally medium or long-term
- They refer to larger scale objectives that are achieved by using short-term planning
- Can be changed by making new decisions

(Sanz 2006.)

3.4 Strategigram as a Service

The main end-users of the Strategigram will be the managers of those science parks that belong to the International Association of Science Parks (IASP). The Strategigram will become an on-line service for the member parks. (Sanz 2006.) The service allows benchmarking and self-evaluation and offers the managers the possibility to see the profiles of the rest of the 309 (March 2006) member parks (Sanz 2006; IASP Presentation 2006). The managers may examine the profiles of the most successful science park around the world or compare themselves to other similar parks. (Sanz 2006.)

This on-line service for the members can be accessed from the IASP's website by first entering the required data for creating one's own profile. The information entering process may not take too long time so that the managers will fill in all the needed information. This sets limitations to the criteria within the Strategigram as well. The number of questions cannot be too large or otherwise the data acquisition process will get more difficult as the managers may not be eager to fill in the data. (Sanz 2006.) The online service is replaced in the pilot test by a questionnaire sent via e-mail.

3.5 Introduction of the Axes

Next, the seven axes of the Strategigram are introduced. The idea is to give the reader the basic idea about what these axes deal with and the discussion is kept to a minimum, mostly excluding the background of the indicators used. Whether these axes are appropriate or not, is discussed later.

3.5.1 Location and Environment

The Location and Environment axis refers not only to the geographical location of the park but also to the park's attractiveness from the employees' perspective. One of the main criteria – having the biggest weight – is whether the park is located inside or outside a city. Two important benefits from the urban location are the attractiveness of the cities as a living environment and the proximity of universities and other higher education institutes that give better access to the labour markets. However, a park located outside the city boundaries may overcome the difficulties of attracting skilled work force by offering housing zones, services and spare time activities. The other criteria concerning the location include the size of the city where the park is located or alternatively the size and distance of the closest city. (Strategigram questionnaire, 2006.) The exact criteria are found from the APPENDIX 1.

3.5.2 Position in the Technology Stream

The term "technology stream" refers to the generation of technology and its transfer from its sources upstream to its recipients downstream. The science parks in the upstream have close cooperation with universities and R&D institutions and emphasise research and development. The science parks in the downstream emphasise more commercial activities – for instance, manufacturing - and are closer to customers. In general, parks positioned in the upstream zone are called as "research parks" and "science parks" and the ones positioned in the downstream zone are called as "technology parks". Nevertheless, this study uses

the term ”science park” as a general term referring to all different kind of science park models. (Sanz 2005c.)

This axis refers to the park’s position between the sources of knowledge creation (upstream) and the markets downstream. The role of the university is one of the main indicators. The ownership structure and the background of the CEO are examined. Another important indicator is the research and development (R&D) activities within the park and its tenant companies. (Strategigram questionnaire, 2006.)

The lack of the university support and the R&D activities refer to the downstream whereas their existence refers to the upstream (Strategigram questionnaire, 2006). The exact criteria are found from the APPENDIX 1.

3.5.3 Target Firms

The Target Firms axis takes a look at the tenant companies within the park. The two extremes of the axis are new start-ups - often referred as the New Technology Based Firms (NTBF) - and mature companies. The NTBFs are the result of seed capital funding and incubation activities whereas the mature companies have already longer history behind them when entering the park or they just have been located in the park for a long time. The axis takes a look at which kind of companies the park emphasises. (Sanz 2005c.) The following things are examined:

- The number of incubators and who is managing them
- The number of tenant companies inside incubators
- The amount of administrative staff devoted to incubation activities
- Seed capital funding and other financial tools to support NTBFs

(Strategigram questionnaire, 2006.)

The exact criteria are found from the APPENDIX 1.

3.5.4 Degree of Specialisation

The Degree of Specialisation axis examines the degree of specialisation of the park with respect to technology sectors. The two extremes are the specialist and the generalist – the semi-specialist representing the equilibrium point. The specialist emphasises only a few technology fields whereas a generalist park fosters several technology fields and admits all kind of technology fields. The main criteria includes:

- The number of accepted technology sectors in the park
- The number of encouraged technology sectors
- Existence of specialised incubators
- The number of tenant companies within the two largest technology sectors compared to the total amount of tenant companies
- Technology Centres
- Special facilities or infrastructures dedicated to specific technology sectors
- Specialists among the management team

(Strategigram questionnaire, 2006.)

The exact criteria are found from the APPENDIX 1.

3.5.5 Target Markets

It is stated in the Strategigram questionnaire that the fifth axis reflects the degree to which the park aims at attracting local, national and foreign companies. In addition to the priorities and the marketing efforts of the park, the origins of the present tenant companies are examined. (Strategigram questionnaire, 2006.)

The following criteria are used:

- The primary marketing objective
- The origin of the tenant companies
- The target of the Marketing expenditure
- Representatives outside the park

(Strategigram questionnaire, 2006.)

The exact criteria are found from the APPENDIX 1.

3.5.6 Networking

The two extremes of the Networking axis are Strategic networking and Casual networking. A strategic networker is a park that plans its yearly networking activities very carefully in advance and has some predetermined objectives. The casual networker acts more spontaneously and does not make any special plans. Neither one of the two models is claimed to be better. Quite a many indicators with low weights are used. The following indicators form part of the criteria used in this axis.

- The frequency of attending and hosting conferences, symposiums, etc.
- Participation to networks
- Networking within the park
- Planning
- Budgeting

(Strategigram questionnaire, 2006.)

The exact criteria are found from the APPENDIX 1.

3.5.7 Management Model

The seventh axis examines the management model of the park. The given two extremes of the axis are institutional model and market-driven model. Again, neither one of the two extremes or any position between them is claimed to be better than any other. High proportion of private ownership, managers with experience from the commercial sector and profit making refer to the market driven model whereas high involvement of the public sector is typical to the institutional model. The university and the government are seen as one institution having such goals as regional development and knowledge creation. It is assumed that the public ownership and managers whose working experience come from the public sector promote these non-commercial objectives. (Strategigram questionnaire, 2006.)

The used indicators include:

- The nature of the management body of the STP
- Ownership structure
- Cash flows from the public sector
- Composition of the Board of Directors (BOD)
- Background of the CEO
- Existence of performance related incentives

(Strategigram questionnaire, 2006.)

The exact criteria are found from the APPENDIX 1.

4 WHY STRATEGIGRAM?

This chapter goes through briefly the prior research on the science park phenomenon. The discussion introduces those elements that are common to the prior research and the Strategigram.

4.1 Demand for More Research

Cabral (1998) recognises the lack of systematised accumulated knowledge about science parks and their theoretical framework deriving from the quick expansion of the science park phenomenon that would permit the science park managers to obtain concrete and flexible recommendations concerning their parks (Zhang 2005, 139). Zhang argues that the high risk and needed capital and the high failure rates associated with the establishment of a science park call for better understanding of science parks and more research on the topic (Zhang 2005, 139). A number of different kinds of methods to classify science parks derive from this need. Many studies have aimed at finding out why some parks are more successful than others. (Sanz, 2005c.)

There are many interesting attempts to classify and measure performance of science parks but they have primarily been limited to national or regional levels or just examining one or two elements of a park. No method that could be applied to all the science parks around the world has been developed. As one of the problems Sanz lists the diversity of the science park models. In addition, he points out that the different socio-economic contexts co-existing in the world avert the situation even more. According to Sanz, the prior research has given good insights about science parks and has helped us to better understand their complex nature. Yet, he claims that there is a need for developing a method that enables us to assess and compare science parks worldwide. He states that the prior research has mainly focused on two things: assessing the performance of science parks and classifying science parks according to their main features. (Sanz, 2005c.)

Initially, Sanz considered the classification of science parks as one of the main objectives of the Strategigram. Afterwards his opinion has changed a little bit. When interviewed in April 2006, Sanz revealed that the classification of STPs is now considered as an extra feature. Whether the Strategigram enables some kind of a new classification of STPs is to be seen but in any case it is not the primary objective. Such a classification could help us to better understand science parks. Instead, Sanz names three other potential uses for the Strategigram. Sanz

considers benchmarking as the most important one of these uses. Of course, it should be kept in mind that the Strategigram does not allow benchmarking science parks directly. The Strategigram is merely a descriptive tool and thus the criteria for defining, what is a successful science park, must come from somewhere else. However, once a successful science park has been defined and located, the Strategigram enables studying the different features of the park at one glance. Taking a look at the seven strategic issues - that comprise the Strategigram - at the same time may reveal some of the success factors of the park and their interrelations. The profiles of the less successful parks in the same region may reveal the underlying reasons for the differences in their prosperity. Sanz states that the Strategigram is also a good way to keep a record on the evolution of a science park. The aim is that the science park managers can see to which direction their park is going and to make sure that they control these changes. Finally, the Strategigram can give good insights to those who are just about to create a new science park. Those who are creating a new park may observe what kind of things they should keep in mind and to what kind of solutions the other parks in the same region have ended up. The Strategigram could reveal what kind of STP models work well in similar areas and socio-economic contexts and what are the typical features of such parks. (Sanz, 08.03.2006)

4.2 Aiming at Success

Success is something that all the science park managers naturally aim at when running their parks. What is success then is, of course, another issue. Ever since their emergence, the high failure rates have followed science parks. High failure rates have generated the need for understanding the science park phenomenon and why some science parks are more successful than others. (Zhang 2005, 139.) The process of learning from the good practices of the competitors and other companies is generally known as benchmarking.

Brown defines that the first step in evaluating success is to develop a clear understanding of what is expected (ISSUES in Science and Technology, 2006).

This allows evaluating the performance of one park although it does not allow the park to be compared to other parks as their motives and objectives may vary from park to park. University and government owned science parks could aim at knowledge transfer and regional development whereas privately owned parks could have more commercial objectives. In addition, some parks might be more ambitious in their objectives than others and in this kind of a comparison they would not succeed very well albeit it would be merely a question of more demanding goals. According to Brown, the success of university-based research parks is conventionally defined entirely in economic terms – the number of companies started, jobs created, property values enhanced and so on (ISSUES in Science and Technology, 2006).

Ylinenpää states that the prior research has contributed a list of characteristics of successful Science Parks (e.g. Poulakka 1992). According to his findings from the literature "*Success factors which are often depicted include a favourable image related to the park; access to a nearby, local market for products and services produced in the park; access to suppliers of components and services in the region; a local culture favouring innovation, entrepreneurship and co-operation; access to employees with adequate (and normally high) formal qualifications; access to venture capital and good communications; and an attractive working and living environment.*" (2001, 3.)

Ylinenpää argues that successful science parks have paid special attention to appropriate premises allowing expansion of the tenant companies; such shared support functions as office services, meeting rooms, IT-infrastructure and management and training services; and formal and informal arenas for social interaction. The formal and informal arenas for social interaction refer mainly to the internal networking between the tenant companies within the park and the external networking between the tenant companies and university research and other related institutions. These characteristics are often referred as necessary but not sufficient for being successful. (Ylinenpää, 2001, 3.)

4.3 Success and Clusters

Clusters – and their benefits - are often mentioned when speaking of science parks. The Harvard Professor, Michael Porter, developed the cluster concept - hence the name “Porter’s cluster” which is used as a synonym for the term “competitive cluster”. He defined a cluster as a geographical location where there are enough resources and competences to reach a key position in a given economic branch of activity. In general, a cluster can be divided into two categories, namely techno clusters and historic know-how-based clusters. The techno clusters are well adapted to the knowledge economy and often have as a core universities and research institutes where as the latter ones support more traditional activities and have gained their know-how over the years. (Wikipedia, Porter’s cluster, 2006.) Good examples of successful clusters are the world famous Silicon Valley and Route 128. Saxenian (1985) reported that the existence of universities with advanced and highly recognised research in specific technological areas (Stanford and MIT) and the existence of large corporations as tenant companies (Hewlett-Packard and Digital Equipment Corporation) were success factors common to both of them (Ylinenpää, 2001, 3).

An analysis of the local authorities of the critical success factors for the knowledge-based industrial clusters in the area of Wisconsin listed several success factors. As one of the main problems, was seen the escape of the best and brightest university graduates to more dynamic economic centres. As the critical success factors they considered: availability of start-up capital; R&D capabilities; availability of skilled labour; training and education structure; energy, transportation and information infrastructure; presence of the market leading companies; entrepreneurial climate; business climate; and quality of life. (Blanchart, Mone, Sheehy & Torinus, 2001, 12-14.)

Chen admits that although the success of the Hsinchu Science Park (HSP) as high-tech industry cluster is widely recognised the actual success factors of the Taiwan science park still remain somewhat unclear (2005, 1). Bresnathan, Gambardella, and Saxenian (2001) studied the HSP industrial cluster along with other successful clusters such as Cambridge of UK and Banglore of India and

found out that entrepreneurship, linkage to a growing market and supply of skilled labour force were the key success factors to starting a high-tech cluster (Chen, 2005, 1).

4.4 Classifying Science parks

Sanz argues that the classifications for different science park models have concentrated mainly on two themes: their relation to universities and their geographical and physical aspects (Sanz, 2005c). In many papers the urban location and proximity to universities are seen as requirements for success. The Sophia Antipolis Science Park in France is a good example of how this is not always the case. This rural park - which does not have close ties to universities and other research institutes - has substituted the benefits of an urban location with a pleasant environment and other kind of competitive advantages. The Ronneby Soft Center in Sweden is another example of rural parks that initially did not have cooperation with any universities. However, soon after its establishment - thanks to the park - a university was established in Ronneby. (Ylinenpää, 2001, 4.)

Such names as Technology Park, Research Park, Technopole and Science City derive from the attempts to classify science parks although they are often used as synonyms in colloquial language. For instance, such terms as Science Park, Research Park and Technology Park may refer to their position in the technology stream. (Sanz 2006.) According to Grayson (1993), Research Park - being in the highest position of the technology stream - is a pure academic initiative promoting knowledge creation rather than acquisition of rental income. The Science Park is often located close to a university or some other research institutes and emphasises both development work and pure research. The Technology Park, being on the other extreme of the technology stream, is often more commercially oriented allowing production and sales activities and keeping the academic involvement to a minimum. (Zhang 2005, 140-141.) Taking a look at the position in the technology stream is an interesting way to classify science parks in deed and is applicable in global scale. However, the method is limited to

only one issue and the definitions for the terms may vary according to the person who is using them.

Zhang claims that the prior research divides science parks into three schemes, namely: the park/campus style, the centre/incubator style and the city/region style according to the parks' physical manifestations and subsequent attributes, such as internal actors and organisational features. (Zhang, 2005, 147 - 149).

There are many ways to classify science parks but Sanz feels that they are insufficient. He lists three main defects that concern the prior research. Firstly, he thinks that the prior classifications are useful but insufficient and do not reflect well enough the complex nature of a science park. Secondly, the results are mainly static and do not allow continuous monitoring of the evolution of a park. Thirdly, the classifications are merely descriptive and do not allow benchmarking. (Sanz 2006.)

4.5 Benchmarking

Benchmarking – sometimes also referred as the best practice benchmarking or process benchmarking – refers to a process in which organisations evaluate different aspects of their processes in respect to the best practice usually within their own field or sector. Thus, these organisations can come up with plans on how to adapt the best practices in their own operations and improve their performance. One of the main benefits of benchmarking is overcoming the so-called paradigm blindness. The paradigm blindness derives from the past practices that are experienced to be the best ones. It is thought that things should be done in a certain way because it is the way that things have always been done and not because it would be the most efficient way. Benchmarking refers to constantly searching for better and more efficient ways to carry out certain processes or activities. (Wikipedia, Benchmarking.)

What make benchmarking science parks so difficult are the different models and the different socio-economic conditions they are operating in. Even though

recognising successful science parks would be easy, one would still have to figure out why those parks are successful. A deeper understanding of science parks is needed in order to benchmark them. For instance, suggesting that a park specialised into one or two technology sectors – say, biotechnology and ICT – would be enough for making a science park successful cannot be enough. If one single factor could make a science park successful, the world would be full of successful science parks. However, the failure rates of science parks indicate something else. The characteristics of a science park should not be examined separately since this would not reveal the possible interrelations between them. Instead, taking a look at all the main elements of a STP at the same time is required. For example, the urban location of a park, specialisation in only two technology sectors and international markets as a combination could be the key success factors for a certain science park. Separately these factors would not make a difference but together they could. In order to do that – the author argues - a method that allows examining the different aspects of a science park at the same time is needed.

4.6 Strategigram and the Prior Research

The discussion above listed several factors that have played crucial role in promoting the success of many science parks. The factors that the literature has given special attention are listed here:

- Access to skilled work force
- Relation to universities
- Attractive working and living environment
- Existence of larger companies in the park
- Entrepreneurial climate
- Access to markets
- Formal and informal arenas for social interaction
- Specialisation

Sanz argued that the prior attempts to classify science parks have mainly concerned:

- Relation to universities
- The location and physical aspects of the park

In addition, the Three Sides Participation Theory was discusses briefly in the second chapter. This theory explains the interrelations of the government, the university and the industry.

TABLE 4. Summary of the similarities between the Strategigram and the prior research and the literature.

AXIS	**SIMILARITIES**
1. LOCATION AND ENVIRNMENT	- Access to skilled work force (Ylinenpää, 2001; Bresnathan, Gambardella, and Saxenian, 2001) - Attractive working and living environment (Blanchart, Mone, Sheehy & Torinus, 2001) - The location and physical aspects of the park (Ylinenpää, 2001)
2. POSITION IN THE TECHNOLOGY STREAM	- Access to skilled work force (Ylinenpää, 2001) - Relation to universities (Saxenian, 1985; Blanchart, Mone, Sheehy & Torinus, 2001)
3. TARGET COMPANIES	- Existence of larger companies in the park (Saxenian, 1985) - Entrepreneurial climate (Ylinenpää, 2001)
4. DEGREE OF SPECIALISATION	- Specialisation (Saxenian, 1985)
5. TARGET MARKETS	- Access to markets (Ylinenpää, 2001)
6. NETWORKING	- Formal and informal arenas for social interaction (Ylinenpää, 2001)
7. MANAGEMENT MODEL	- Relation to universities (Saxenian, 1985; Blanchart, Mone, Sheehy & Torinus, 2001) - The Three Sides Participation Theory (Jisong 1998)

The TABLE 4 shows that all the seven axes of the Strategigram are linked to the prior research in a way or another. In addition, most of the issues listed are strategic questions and in the prior research were associated with the success of some science parks. Sanz has combined all these strategic issues into one entity consisting of seven axes.

The multidimensionality is one of the main differences of the Strategigram compared to the prior attempts to classify and benchmark science parks. Instead of only one or two elements, the Strategigram consists of a number of strategic issues and thus should give a more comprehensive picture of the park examined. The fact that the axes concern strategic issues is another major - and according to Sanz very important – difference in comparison to the prior research. Moreover, the aim is to develop a method that is applicable around the world. These features make the Strategigram truly more comprehensive method than the prior attempts. The author does not comment whether the Strategigram can be applied benchmarking or classifying science parks. This study merely explores these possibilities in section 6.6.

5 THE PILOT TEST

5.1 Sample Group

The pilot test aims at finding out the main defects of the Strategigram and making improvement proposals. The goal is to develop the Strategigram so that the method would be applicable around the world and majority of the science park managers would agree with their Strategigram profiles. The Strategigram should be applicable to as many different science park models as possible. The pilot test uses the Strategigram questionnaires – designed by the IASP – as the main source of information.

The intention was to conduct the pilot test within Finland and near-by regions, the emphasis being on Finland. Out of the twelve science parks in Finland that are members of the International Association of science parks seven were selected.

Moreover, one park from Tallinn (Estonia) and two parks from Stockholm (Sweden) were included in order to make the sample group more international. The parks were selected carefully so that they represented a number of different kinds of science park models.

The selection process aimed at selecting parks with different strategic approaches. However, due to the poor response rate, reported later on, some additional parks were used in the analysis part of the study. The IASP was able to provide the answered questionnaires of seven additional parks from different parts of the world for this pilot test. The additional parks are:

- Research Triangle Foundation of North Carolina, *United States*
- Manchester Science Park Limited, *United Kingdom*
- Fundación Parque Científico y Tecnológico de Albacete, *Spain*
- Fundación Innova, *Valencia, Spain*
- Corporación Parque Tecnológico Sartenejas, *Venezuela*
- Thailand Science Park, *Thailand*
- Scion DTU a/s, *Denmark*

Out of the ten parks that formed the original sample group only four answered to the questionnaire and their respondents were interviewed. These parks are listed here:

- Turku Science Park, *Finland*
- Technopolis Plc., *Finland*
- Stockholms Teknikhöjd AB, *Sweden*
- TEHNOPOL - Tallinn Technology Park, *Estonia*

In total, the sample group comprises of eleven parks. Although, the interviews of six parks from the original sample group were missed, the new sample group offers much more international perspective. The new sample group includes science parks from four different continents, namely South America, North America, Asia and Europe. Hence, the findings should reflect much better the forthcoming target audience than what the original selection have had. These eleven parks represent different kind of science park models. However, not all of

these models suited the Strategigram model as such. The four interviews were enough to find out the main concerns of the Strategigram target audience. More interviews were not needed as the most useful information was gathered from the questionnaires.

5.2 Questionnaire

The Strategigram questionnaire (APPENDIX 1) was sent on 20th March 2006 to the ten science park managers of the original sample group. First answers were received within three weeks. A reminder was sent in the beginning of May to the remaining six parks. None of the remaining parks answered in spite of the reminders. The response rate was poorer than expected – 40%. As one of the possible reasons could have been the amount of time required for filling the questionnaire.

The IASP had provided the needed questions. By the authors request some additional questions were added. The author wanted to ask the science park managers' own views about their position. This way the Strategigram results would have a reference point and the analyses of the different weightings could be based on something. In order to facilitate their self-evaluation process the IASP added brief explanations of the essence and nature of the seven axes. Some of these brief explanations are also discussed later. The additional questions also included a section asking the managers to evaluate the importance of each axis separately and the whole Strategigram as one entity.

Each park is created a profile based on the original criteria provided by the IASP. The parks are also given another profile based on the self-evaluations. The discrepancy for each park on each axis is calculated showing the differences between the Strategigram profiles and the self-evaluations. The analysis part aims at finding out the reason behind the biggest discrepancies and eliminating them.

5.3 Personal Interviews

In spite of the difficulties, the interviews were started in the beginning of June. The respondents of the four parks – namely Turku Science Park, Technopolis Plc, Tehnopol Tallinn Technology Park and Stockholms Teknikhöjd AB - were interviewed.

The first interview was carried out on 1st of June. Tapani Saarinen from Turku Science Park was the first person to be interviewed in this pilot test. Saarinen accepted the Strategigram profile. The Position in the Technology Stream axis was the only axis that had a major error – the self-evaluation being (+1) whereas the profile resulting the score (–9). Saarinen admitted that his estimation in this particular axis had been a little bit too strong. The interview revealed that the discrepancy on the fifth axis – The Target Markets axis – was the result of poor explanations and definitions. The nature of that axis remained unclear thus resulting a distorted result. FIGURE 2 shows the profile of Turku Science Park. The other interviews confirmed this as well. The fifth axis needed to be changed somehow. The interview gave some new ideas for developing the Strategigram. Saarinen mentioned that being part of the university campus is one of those things that make their park more attractive. Thus, whether a park is part of a university campus or not was included to the criteria of the first axis.

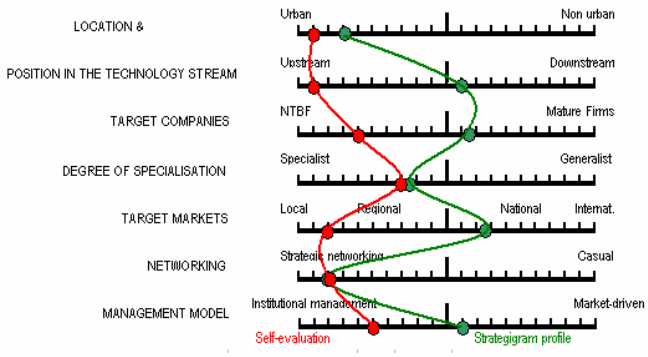

FIGURE 2. The Strategiram profile and self-evaluation of Turku Science Park, Turku.

The science park manager - Raivo Tamkivi from Tallinn's Tehnopol – also emphasised the importance of the presence of the university. The discrepancies concerning Tehnopol were extremely small as FIGURE 3 shows. Their science park model seemed to suit the Strategigram almost perfectly whereas Technopolis from Helsinki, the profile shown in FIGURE 4, was one of the most problematic cases. As Keith Silverang stated the problem is that Technopolis comprises of several sites whereas the Strategigram is planned for single-site science parks primarily. Multi-sited parks – such as Technopolis - cannot be examined as such without suffering major problems since each site is different in many ways. Also the management model of Technopolis is not centralised but networked and thus does not fit the Strategigram. Silverang pointed out that networked management models have replaced the centralised ones in many organisations.

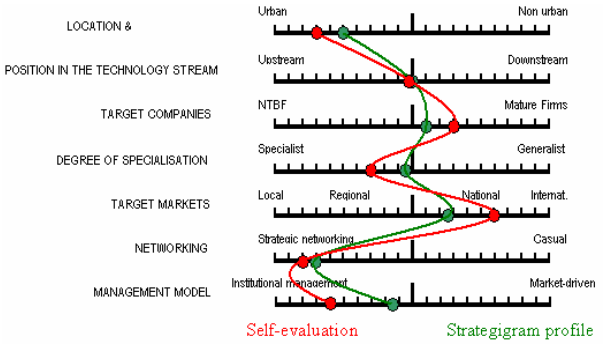

FIGURE 3. The Strategiram profile and self-evaluation of Tehnopol, Estonia.

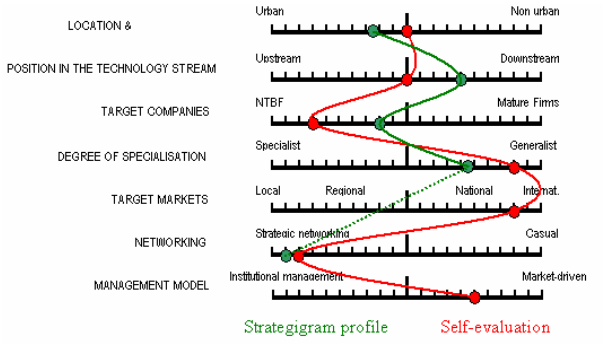

FIGURE 4. The Strategiram profile and self-evaluation of Technopolis, Helsinki.

The last interview was carried out on 1st of August. Torbjörn Hansson from Stockholms Teknikhöjd agreed with the profile and wanted to correct the answers

on the first axis. However, these corrections increased the discrepancy. He stated that he had problems estimating their own position on the seventh axis and that the axis could be interpreted in two different ways. At the moment, the axis is some kind of a mixture of the management model and the ownership structure. Hansson stated that his answer depends on which one is examined. Evaluating them both at the same time was very difficult. This is probably the reason why the biggest discrepancy in their profile was found from the seventh axis. FIGURE 5 represents the profile of Stocholm's Teknikhöjd.

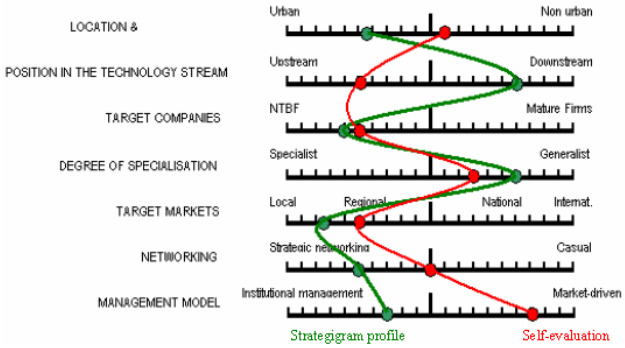

FIGURE 5. The Strategiram profile and self-evaluation of Stockholms Teknikhöjd.

5.4 Research Process

First, all the parks are created a profile according to Luis Sanz's initial criteria and weights. Once each park has a profile, they are compared to the self-evaluations of the respondents. All the bigger differences are marked and examined. The purpose is to find out if certain criteria cause these differences between the STP managers' opinions and the Strategigram profiles. Of course, it is kept in mind, that managers might have different backgrounds and different ways of thinking thus having different views on same things. Their self-evaluations are considered as rough estimations. Discrepancies equal or smaller to four points are considered acceptable.

When new weights are tested, the aim is that the weights can be changed in such a way that they will not make bigger changes to those profiles that already match the STP managers' views and at the same time converge the gap between those self-evaluations and profiles that do not match at all. Of course, a great deal of compromises is needed. The aim is to create a method that could be generally accepted among the science park managers. Chapter six introduces some proposals concerning each of the seven axes and the whole method in general.

6 FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

6.1 Analysis of the Axes

Next, all the seven axes examined. Those weights that are not analysed in any way, are not shown. All the irrelevant information is excluded from the tables since this information is not required for understanding this study. Moreover, the IASP is aware of the original weights and thus this information is excluded.

6.1.1 Findings from the First Axis

The first axis is working quite well. Yet, the author wants to test an approach where the working environment of the park would have more emphasis. Whether a park is located in a city or not is considered less important and the weight is transferred to the services surrounding the park. This kind of a model resembles that a science park does not necessarily have to be located in a big city in order to offer an attractive working environment. In addition, a new indicator to this axis is introduced asking whether the park is located inside or adjacent to a university campus. The idea is that the presence of the university would make the park better linked to the primary sources of knowledge. It would also make the working environment livelier and give more opportunities to both the students and the tenant companies. This information is borrowed from the second axis and thus requires no further information acquiring. TABLE 5 shows the original weights as well as the weights that are tested.

TABLE 5. Old and new weights of the first axis.

AXIS 1 - LOCATION		Old	NEW
STP inside a city?	Yes	-5,00	-3,00
	No	5,00	3,00
Population	>500,000	-0,50	1,00
	100,000-500,000	0,00	0,00
	<100,000	1,00	-1,00
Distance to the city (Non urban)	>50 km	3,00	3,00
	10-50km	0,00	0,00
	<10 km	-1,00	-1,50
Residential zones in STP? (Urban)	Yes	-2,00	-1,50
	No	0,00	0,00
Residential zones in or adjacent? (Non urban)	Yes	-2,00	-2,00
	No	0,50	0,50
Residential zones within 5 Km from STP? (Non urban)	Yes	-1,00	-1,00
	No	0,00	1,00
Leisure centres (restaurants, pubs, cafeterias…) open after working hours? (Urban)	Yes	-0,50	-0,70
	No	0,00	0,00
Leisure centres (restaurants, pubs, cafeterias…) open after working hours? (Non urban)	Yes	-1,50	-1,50
	No	0,50	1,50
Sports and fitness (sport centres, gyms…)		-0,50	-0,70
NO Sports and fitness (sport centres, gyms…)		0,00	0,00
Cultural offer (libraries, cinemas, theatres…)		-0,50	-0,70
NO Cultural offer (libraries, cinemas, theatres…)		0,00	0,00
Shops, commercial centres…		-0,50	-0,70
NO Shops, commercial centres…		0,00	0,00
Social services (child care, schools..)		-0,50	-0,70
NO Social services (child care, schools..)		0,00	0,00
Sports and fitness (sport centres, gyms…)		-1,00	-1,20
NO Sports and fitness (sport centres, gyms…)		0,00	0,25
Cultural offer (libraries, cinemas, theatres…)		-1,00	-1,20
NO Cultural offer (libraries, cinemas, theatres…)		0,00	0,25
Shops, commercial centres…		-1,00	-1,20
NO Shops, commercial centres…		0,00	0,25
Social services (child care, schools..)		-1,00	-1,20
NO Social services (child care,, schools..)		0,00	0,25
My Park is located on a university campus or adjacent to it.*			-1,00

Non-urban

Added by the author

The changes in the discrepancies are found from TABLE 6. Surprisingly, the total score of the added discrepancies increased 2,4%. Still, the author is satisfied with the results. The biggest single factor that increased the result was the score of Technopolis. Its own score increased 192% thus affecting the total discrepancy considerably. If Technopolis would have been excluded from the analysis the added total discrepancy had diminished 11,1%. The personal interview of Keith Silverang revealed that he had had difficulties answering the questions of the first axis – among other axes – as Technopolis is a multi-site entity and being able to answer the questions properly would have required a site-specific examination. The author does not recommend creating a method allowing the examination of multi-site parks. This would require a lot additional work and would make the Strategigram less consistent. Thus, the author recommends that multi-site parks should be examined one site at a time and each site should be given its own profile.

Another problematic park was Sartenejas that also had a major difference between the self-evaluation and the Strategigram score. The responded of Sartenejas had stated on the questionnaire that the park is located on the border of the city and does not have any residential zones or leisure activities. However, according to the questionnaire the park is located in a city that has more than half a million inhabitants. Therefore, the author claims that their new score, (-5), is appropriate. Such a big city should offer a lot of skilled work force for the park although the park is nothing more than just a work place. Their own view of their park was the opposite of the Strategigram result. The new weights diminished their discrepancy a little bit as the first question had been given less weight.

TABLE 6. The old and new discrepancies of the first axis.

1st Axis	Discrepancy		
	Old	New	Change
Turku Science Park	2	2,2	0,2
Teknikhöjd - STHLM	5,5	4,7	-0,8
Technopolis*	2,5	7,3	4,8
Tallinn Tehnopol	2	3	1
North Carolina	3	0,1	-2,9
Manchester	2,5	3	0,5
Sartenejas*	11,5	11	-0,5
Thailand	5,5	2,5	-3
Albacete	3	3,6	0,6
Scion	5	2,1	-2,9
Valencia	1	0,5	-0,5
TOTAL	43,5	40	-3,5

*biggest discrepancies

The author recommends these new weights that were tested. These changes would emphasise that the park itself can be and should be more than just a work place. The park should offer possibilities for social interaction during the spare time. This interaction could lead to better cooperation among the tenant companies and new business ideas. This should be the message the Strategigram would give. In addition, the presence of the university is likely to provide even more possibilities both for the university students and the tenant companies. Therefore, the importance of the presence of the university should be highlighted as the new proposal does.

6.1.2 Findings from the Second Axis

On the second axis, the author wants to test which elements of the axis better reflect the thoughts and opinions of the respondents. Two different models, having different approaches, are tested. The first model has more weight on the three different ratios used whereas the other model gives them less weight. The

third option, of course, is to keep the present weights. TABLE 7 shows the three models.

TABLE 7. The old and new weights of the second axis.

AXIS 2	TOTAL AXIS 2	OLD	**MODEL 1**	**MODEL 2**
STP location with respect to University	On campus or adjacent	-2,00	-1,50	-3
	On university land…	-1,00	-0,75	-1
	Not adjacent	1,50	1,00	3
% University share holding	>50%	-1,50	1,25	-1,50
	15-49%	-1,00	-0,75	-1,00
	1-14%	0,00	0,00	0,00
	0%	1,00	-0,75	1,00
% Private companies share holding	>50%	2,00	-0,75	1,50
	15-49%	1,00	0,00	1,00
	1-14%	0,00	0,75	0,00
	0%	-1,00	1,50	-1,50
General Manager background	Academic	-0,50	-0,50	-0,50
	Civil servant	0,00	0,00	0
	Business Professional	1,00	0,50	0,50
	Other	0,00	0,00	0
University Liaison office?	Yes	-0,50	-0,50	-1
	No	0,00	0,50	0,50
Ratio Tenant companies / Tech centres				
	<8:1	-2,50	-3,00	-1,5
	8:1 - 11,9:1	-1,50	-2,00	-1
	12:1 - 15,9:1	-0,50	-1,00	-0,50
	16:1 - 25,9:1	0,00	0,00	0
	26:1- 30,9:1	1,00	1,50	0,50
	31:1- 40,9:1	1,50	2,00	1
	41:1 - 50:1	2,00	2,50	1,50
	>50:1	2,50	3,00	2
Ratio comp employees /Tech centres employees				
	<3:1	-1,00	-1,50	-0,5
	3:1- 4,9:1	-0,50	-1,00	-0,25
	5:1 - 8,9:1	0,00	0,00	0
	9:1- 12:1	0,50	1,00	0
	>12:1	1,00	1,50	0,5

(Continues)

TABLE 7. (Continues)

Ratio comp without own R&D / with own R&D				
	<0,5:1	-1,00	-1,50	-0,5
	0,5:1 - 1,9:1	-0,50	-1,00	-0,25
	2:1 - 3,9:1	0,00	0,00	0
	4:1 - 7:1	0,50	0,50	0,25
	>7:1	1,00	1,25	0,5

None of the three scenarios seemed to be better than any other. The two tested models increased the total discrepancy slightly. The second model decreased the two biggest discrepancies – the ones of Turku and Stockholm - on the axis. However, the second model increased the discrepancy of Sartenejas, the third biggest discrepancy on the axis. As the main aim is to diminish the biggest discrepancies the author recommends the weights of the Model 2. The results are shown in TABLE 8.

TABLE: 8. The old and new discrepancies of the second axis.

2nd Axis	Discrepancy		
	Old	Model 1	Model 2
Turku Science Park*	10	9,75	7,3
Teknikhöjd – STHLM*	11	11,75	8,8
Technopolis**	4	3,75	2
Tallinn Tehnopol	1	1,75	3
North Carolina	0,5	-0,5	2
Manchester	0,5	1,25	2,8
Sartenejas*	7,5	-7,5	8,5
Thailand	4,5	-5,5	5,3
Albacete	2,5	1,5	2
Scion*	7	-5,5	8,3
Valencia	0	0	0
TOTAL	48,5	48,8	50

*biggest discrepancies

**had not answered all the questions

The interview of Raivo Tamkivi from Tallinn's Tehnopol revealed one defect. One of the ratios of the axis takes a look at the amount of technology centres compared to the amount of the tenant companies. Tehnopol does not have many technology centres of its own but there are many technology centres that belong to the university. Hence, they did not get enough minus points, pointing to the upstream position in the technology stream, as they were supposed to. The author suggests that it must be better defined what kind of technology centres can be included to the answer. Such technology centres that have close cooperation with the tenant companies of the park should be included although the park would not own and manage them.

6.1.3 Findings from the Third Axis

The additional answered questionnaires received from the IASP revealed one defect on the third axis. Manchester had a discrepancy of 14 points, that is, the biggest discrepancy of all the parks and axes. The explanation was found from the questionnaire. Their respondent had stated that they have no formal incubation but the small units and community feeling attract newly established companies. Their self-evaluation was on the NTBF-side and thus led to the tremendous discrepancy.

The author recommends two possible solutions to the problem. The problem could be resolved by stating that the minus extreme refers mainly to incubation activities. However, this would result another problem. How would parks like Manchester react to this then? Could they agree with their profiles even though most of their tenant companies would be NTBFs? The other possible solution does not share the same problem. A new indicator could resolve the problem without any additional defects. This indicator would take a look at those New Technology based Firms that are not part of any incubator. What must be done first is to define what is meant by a NTBF. For example, the maximum allowed age of the company could be one of the elements defining such companies in addition to the size of the company. The definition should be kept as simple as possible so that answering the question would not produce the respondents any

extra work. The new indicator could consist of similar ranges as the indicator examining the amount of NTBFs.

In spite of the defect of the young companies not belonging to any incubator, the discrepancies remained relatively small. Of course, introducing this new indicator would require some changes to the weights so that the maximum minus and plus scores would remain as (–10) and (+10) respectively. Turku Science Park had the second biggest discrepancy. Turku considered itself much more emphasised on the New Technology based Firms than mature companies. However, only 10% of their tenant companies are located inside incubators.

Technopolis was suffering again from the same defect as before. Their multi-sited park model and networked management model complicated their situation. The rest of the parks had acceptable discrepancies, that is, four or less points. The TABLE 9 shows the discrepancies on the third axis.

TABLE: 9. The discrepancies of the third axis.

	Discrepancy
Turku Science Park*	7,5
Teknikhöjd – STHLM	1
Technopolis	5
Tallinn Tehnopol	2
North Carolina	4
Manchester*	14
Sartenejas	3
Thailand	0,5
Albacete	0
Scion	4
Valencia	4
TOTAL	45

*biggest discrepancies

6.1.4 Findings from the Fourth Axis

The total discrepancy in the fourth axis was the smallest one of all the seven axes as shown in TABLE 10. Valencia had the biggest discrepancy on the fourth axis. However, the author argues that the Strategigram result (-6,5) is appropriate. According to their answers there are companies from two separate technology sectors. Moreover, the park does not allow more than six different technology sectors. Sartenejas had the second biggest discrepancy (4,5) on the axis. They had given themselves the score (+10), which in the author's opinion might have been a little bit too strong estimation as more than half of their tenant companies come from the two biggest technology sectors. They also have specialised facilities and experts in the management team. Based on the small discrepancies on the axis the author does not recommend any changes to the weights.

TABLE: 10. The discrepancies of the fourth axis.

	Discrepancy
Turku Science Park	0,5
Teknikhöjd - STHLM	3
Technopolis	3,5
Tallinn Tehnopol	2,5
North Carolina	4
Manchester	1,5
Sartenejas*	4,5
Thailand	1
Albacete	4
Scion	3
Valencia*	6,5
TOTAL	34

*biggest discrepancies

6.1.5 Findings from the Fifth Axis

The criteria in the fifth axis are quite complicated. In addition to the two extremes the axis has two additional points both between one extreme and the equilibrium. The four points in the axis are local, regional, national and international markets. Local and International markets are the two extremes representing scores (–10) and (+10) whereas the national and regional markets represent scores (–5) and (+5). In this original system, the weights in certain questions depend on the previous answers. For instance, answering that a park uses fifty percent of its marketing budget to the regional markets would draw the parks position towards the position (–5) a limited distance. Depending on the previous answers and the present score the parks are given either minus or plus points. The weights are not predetermined.

In the authors opinion the biggest problem in the axis is that the result is a mixture of the present state of the park and their objectives. The author argues that the result should represent the present state of the park as the Strategigram is used for making evolutionary patterns. After all, what really matters in reality is where the park is positioned and not where it would like be positioned. Yet, the objectives could be part of the axis although their weight should be much smaller. All the weights should be predetermined. The proposed weights are found from TABLE 11.

TABLE 11. The old and new weights of the fifth axis.

AXIS 5 - TARGET MARKETS		Old	NEW
Marketing priorities	Foreign companies	6,00	1
	National companies	3,00	0,5
	Regional companies	-3,00	-0,5
	Local companies	-6,00	-1
	Others	0,00	0
Tenants origin	Local		
	<25%	1,00	0,5
Total tenant companies	25-34%	0,00	-0,5
0	35-49%	-0,50	-1
Local	50-60%	-1,50	-2
60	>60%	-2,00	-3
Regional	Regional (-5)*		
40	<25%	0,00	0
National	25-34%	-0,50	-0,5
45	35-49%	+ - 1	-1
Foreing + MNEs	50-60%	+ - 1,5	-1,5
5	>60%	+ - 2	-2
	National (+5)*		
% Local	<25%	0,00	0
40,0	25-34%	0,50	0,5
% Regional	35-49%	+ - 1	1
26,7	50-60%	-1,50	1,5
% National	>60%	+ - 2	2
30,0	Intern. + MNEs		
% International + MNEs	<25%	-1,00	-0,5
3,3	25-34%	0,00	0,5
100,0	35-49%	0,50	1
	50-60%	1,50	2
	>60%	2,00	3

(Continues)

TABLE 11. (Continues)

Where is marketing budget spent?	Local		
	0%	1,00	0,5
	1-25%	0,00	-1
	26-50%	-0,50	-2
	>50%	-3,00	-3
	Regional (-5)*		
	0%	0,00	0
	1-25%	+-0.5	-0,5
	26-50%	+ - 1	-1
	>50%	+ - 1.5	-2
	National (+5)*		
	0%	0,00	0
	1-25%	+-0.5	0,5
	26-50%	1,00	1
	>50%	+ - 1.5	2
	Abroad		
	0%	-1,00	-0,5
	1-25%	0,00	1
	26-50%	0,50	2
	>50%	3,00	3
Commercial offices elsewhere?	No	-1,00	0
	Elsewhere within the country	0,50	0
	Abroad	1,00	0

The last question was found useless. None of the parks had a foreign office and the indicator in question increased the total discrepancy in most of the cases. Of course, some parks would have one but according to the pilot test the benefits of this indicator would be much smaller than the disadvantages. Therefore, the author recommends removing this indicator completely. Also, removing the first indicator – the marketing objectives – would reduce the total discrepancy a little bit. However, removing this indicator completely is not a necessity. Although this indicator does not diminish the total discrepancy it has value as statistical information.

Interestingly, reducing weight from the “breakdown of the companies” indicator – which actually represents the present state of the park – and putting more weight on the “where do you spend your marketing budget” indicator would have

diminished the total discrepancy. It seemed like the managers had made their self-evaluations according to where they would want to be and where their objectives are instead of where they are positioned in reality. The other possibility would be that the fifth axis is missing one indicator that would fix the score somehow.

The definition given in the questionnaire before letting the managers evaluate their own position in this axis is following: "*Besides establishing their commercial priorities regarding the type of companies that they want to attract, parks must also set priorities regarding the markets that they want to focus on. This axis will determine such priorities, telling us whether a park is mainly concerned with attracting companies from its own local/regional environment or whether it emphasises wider markets (national or international).*"

The author argues that this text must have been somewhat misleading. The managers are asked to evaluate where their objectives are rather than where they are positioned at the moment. This explains why setting more weight on the "marketing objectives" indicator would have reduced the total discrepancy. Nevertheless, if the purpose is to examine the present marketing objectives the mentioned indicator should be given more weight. In any case, it must be stated clearly what is wanted. The author recommends that the indicator is given less weight. The effect of the recommended changes is shown in TABLE 12.

TABLE 12. The old and new discrepancies of the fifth axis.

	Discrepancy		
	Old	New	Change
Turku Science Park	9,5	9,5	0
Teknikhöjd - STHLM	3	1,5	-1,5
Technopolis	-	-	-
Tallinn Tehnopol	8,25	7,5	-0,75
North Carolina	8	7,5	-0,5
Manchester	15,25	13,5	-1,75
Sartenejas	4	2,5	-1,5
Thailand	3,75	4	0,25
Albacete	5	4,5	-0,5
Scion	4,5	3,5	-1
Valencia	8,25	6,5	-1,75
TOTAL	69,5	60,5	-9

*biggest discrepancies

6.1.6 Findings from the Sixth Axis

The sixth axis examines the networking activities of a science park from a strategic point of view. Although some of the indicators seem quite quantitative the author argues that they do reflect to some degree the park's commitment to networking. Being part of many formal and informal networks may seem a little bit vague indicator at first sight. However, the weight that each question in this axis has is very small. Moreover, for instance, not being part of any networks would certainly not indicate a strategic approach to networking activities. Yet, the author claims that their weight could be even less than they are at the moment. The author recommends that one or more indicators - that would better reflect the difference between a strategic networker and a casual networker - to be added. The author wants to point out that the purpose is not to measure anything. Many of the indicators in this axis presume that the lack of some activities signal that one is a casual networker. For instance, the more a park organises conferences the more strategic networker the park is considered whereas not organising any conferences would draw the parks position towards the casual networker extreme. The author claims that there is a risk that this may be interpreted as measuring.

Nevertheless, these kinds of indicators have one benefit – they are objective. The answer to these questions is a numeric one and therefore the answers are less likely to be distorted. Yet, the author recommends other kind of indicators to be used. These indicators would examine the reason why one is networking instead of the frequency. TABLE 13 shows an example of one way to look at the underlying reasons for the networking activities of a park. This indicator examines whether the networking activities of a park have clear predetermined and measurable objectives or not. Having such goals would indicate that one is a strategic networker. Of course, the main defect of this kind of indicator is that it is somewhat subjective compared to the numeric ones. The author claims that using both kinds of indicators would balance the good and bad sides of both ways. TABLE 14 lists the questions that are used in the sixth axis.

TABLE 13. Proposal for a new indicator (the used scores are just an example)

The main reasons why you belong to clusters or networks (choose max. 2 answers):		
Finding new contacts	*(strategic)*	*-1 point*
Expanding the markets	*(strategic)*	*-1 point*
Finding financing	*(strategic)*	*-1 point*
Finding new ideas	*(more casual)*	*+1 point*
Making the park more known	*(more casual)*	*+1 point*
Aiming at knowledge exchange	*(more casual)*	*+1 point*

TABLE 14. List of the questions used in the sixth axis (Scales of the quantitative questions not shown).

6.1. On average, how many conferences, symposiums, etc., does your Park organise or host annually?
6.2. On average, how many conferences, symposiums, etc., do you or other representatives or your Park attend annually?
6.3. How many formal networks does your Park belong to?
6.4. Is your Park the leader of one or more associations or networks?
6.5. Please give an estimation of how many informal networks your Park participates in.
6.6. How many agreements or strategic alliances has your Park signed which are currently active?
6.7. How often does your Park run programs and activities to enhance the networking and cooperation between tenants?
6.8. Additionally, how many different types of these networking events does your Park organise?
6.9. Has your Park implemented any IT-based tools to facilitate networking between tenants?
6.10a. Does your Park have specific tools, programmes or personnel to support the international contacts and networking of your tenant companies?
6.10b. Please indicate which statement reflects your situation regarding networking in your Business and Strategic Plans? - Networking is not considered. - Networking is considered in a section along with other activities. - Networking has its own section.
6.11. Please indicate which statement reflects your situation regarding networking in your Annual Budget? - There is no budget for networking. - Networking is included as a part of a larger budget (not separately). - Networking has its own budget.
6.12. What percentage of your Annual Budget is solely dedicated to networking?

6.1.7 Findings from the Seventh Axis

The interviews revealed that some of the respondents found the seventh axis somewhat contradictory. The axis is a mixture of the ownership structure of the park and who manages the park. Torbjörn Hansson from Stockholms Teknikhöjd

pointed out that these two things are complete different issues. Depending on which one is examined his answers would vary. The self-evaluation on the seventh axis – which comprises of these two elements – caused him trouble. However, when interviewed in April (2006) Sanz expressed that an axis examining the mere ownership structure of a park is not interesting enough.

In the author's opinion the axis should be fine-tuned and the nature of the axis should be explained better. Based on the four interviews, the author argues that the biggest problem of the seventh axis was the poor explanations used in the questionnaire. The main idea of the axis remained unclear. Therefore, it is recommended that this axis should be explained better.

The interviews revealed that the decentralised management model of Technopolis did not suite the Strategigram very well. Keith Silverang also pointed out that this kind of a management model has replaced the traditional centralised model in many parks. This fact should not be ignored. The author claims again that parks should be examined one site at a time. The management of each site should be examined separately. Whether this is a realistic option or not, requires the examination of several parks that resemble such untraditional models as the Technopolis of Helsinki. This study included only one such park, hence closer examination was not possible.

6.2 Pilot Test Results in General

The pilot test included eleven science parks in total. Each park's profile included seven axes, thus resulting 77 self-evaluations and Strategigram scores altogether. All these self-evaluations and original Strategigram scores were calculated a discrepancy. 41,6% of all the discrepancies were within the allowed limits set by the author, that is, discrepancy equal or smaller to 4 points. All the self-evaluations, Strategigram scores and discrepancies are found from APPENDIX 2. These results were not promising. More than half of the discrepancies were not within the accepted limits. However, it was already stated in section 5.3 that many of the discrepancies derived from misunderstandings. The author claims

that mere correction of the explanations used in the questionnaire would have resulted different self-evaluations and would have resulted smaller discrepancies. Of course, the indicators and weights formed the Strategigram results but the author argues that the incorrect self-evaluations affected the final results the most. Axes five and seven – the axes that had the most misunderstandings – represented 43,8% share of all the discrepancies outside the accepted boundaries.

6.3 Importance Matrix

The author had requested the IASP to include some additional questions to the questionnaire in order to evaluate the importance of each respective axis and the whole Strategigram as one entity. The managers had six potential answers to choose from. The answers and their codifications in the analysis are listed here:

- Not at all important, 1
- Not really important, 2
- Somewhat important, 3
- Important, 4
- Very important, 5
- I do not know, 0

The answers of the eleven parks concerning the seven axes resulted altogether 77 answers out of which only one stated “Not at all important” and three ‘Not really important’ representing 1,3% and 3,9% shares respectively. TABLE 15 shows the results of the query.

TABLE 15. STP managers' answers concerning the importance of each axis separately.

Axis	1	2	3	4	5	6	7
Turku Science Park	5	4	5	4	5	5	3
Teknikhöjd - STHLM	3	3	4	2	3	3	4
Technopolis	4	4	5	4	5	5	4
Tallinn Tehnopol	3	5	4,5*	3	4	4	3
North Carolina	5	4	4	4	4	4	5
Manchester	5	4	4	1	4	5	5
Sartenejas	3	3	5	5	5	2	5
Thailand	4	5	4	4	5	3	4
Albacete	5	5	5	4	4	5	4
Scion	3	5	5	3	3	4	4
Valencia	4	5	5	4	3	2	5
Frequency of the lowest answer(s) / park	1			**4**		**3**	2

The lowest importance concerning each park's all answers, if anwers is 4 or more, none circled

Low score, yet not the lowest answer of the respondent

*The respondent had marked two answers (4 and 5)

Average	4,0	4,3	4,6	3,5	4,1	3,8	4,2
Standard deviation	0,89	0,79	0,49	1,13	0,83	1,17	0,75

Two lowest averages and standard deviations circled

The third axis – Target Companies axis - seemed to be the most valued one. All the managers considered it either important or very important. The highest average and the smallest standard deviation confirmed that the all the science park shared the same view. Also, the second axis was valued highly. The average reached 4,3 although the standard deviation signalled minor differences in the managers' opinions. Only one STP manager had experienced this axis only somewhat important.

The first and the seventh axis followed next the previously mentioned axes in the order of importance. Both of them had been given two times the answer 'Somewhat important' and shared the same standard deviation as most of the

other axes. Interestingly, the seventh axis was valued quite highly although the interviews had revealed that the STP managers had suffered major problems answering this axis. This was a clear message that although the seventh axis seemed to be somewhat chaotic in its present form the axis should be developed further and not excluded. However, the fourth axis - which was the only axis that in the author's opinion did not need any modifications - was assigned as the least important. 36,4% of the lowest answers belonged to this axis. Yet, one of the biggest standard deviations indicated that not all the managers shared this view. In spite of the low average, more than half of the answers concerning this axis stated that the axis is important.

The sixth axis was considered as the second least important axis. In this axis as well, the big standard deviation indicated big differences in the managers' opinions.

The seven axes are listed in the order of importance (the most important axis first):

- Target Companies
- Position in the Technology Stream
- Management model
- Target Markets
- Location and Environment
- Networking
- Degree of Specialisation

(The ranking is based on the averages)

The author wants to point that that the big standard deviations on the fourth and sixth axes have a clear message that the views and opinions of the science park managers can vary quite a lot. This means that no matter what is done this kind of a methodology would not get the full support of all the science park managers. The author argues that these answers are enough to confirm that the present seven

axes are important enough and none of them should be excluded from the Strategigram.

Concerning the Strategigram as one entity the majority of the respondents felt that this instrument is either important of very important. Interestingly one respondent did not know how to answer this question. There was also one respondent who stated the Strategigram is only somewhat useful. TABLE 16 shows the distribution of the answers.

TABLE 16. The distribution of the answers of the Strategigram evaluation.

I do not know	9,1 %
Not at all useful	0 %
Not really useful	0 %
Somewhat useful	9,1 %
Useful	36,4 %
Very useful	45,5 %
	100,0 %

6.4 More Value for the Online Service

What did not indicate big interest among the STP managers concerning the Strategigram is the poor response rate of the pilot test in Finland and the near-by regions. Only 40% of the parks responded in spite of the reminders. Therefore, once the Strategigram is launched the IASP must somehow make sure that they can gather big enough database so that the existing users really can benchmark a number of parks from different regions. The idea is to give access to the database subject to entering your own park's information first. In addition, the online service could provide more than just mere Strategigram profiles. The service could be developed into a considerable database of different kind of STP models and their benefits. Each seven axes could have a link to related articles and databases. Perhaps, it could also have a forum where people could comment these models and share experiences. The database could include, for instance,

information about ways to attract skilled work force, potential value-adding services for the tenant companies or how to make your incubator more successful – just to mention a few. The benefits and defects of such things that came up in the interviews as networked management models and multi-sited science parks could be discussed there. At least those parks that have just started or are growing would probably appreciate the experiences of the other parks.

6.5 Other general remarks

The poor response rate – only 40% - of the original sample group was reported earlier. The reason for the poor response rate remained unclear but some respondents had pointed out that answering the questionnaire took quite a lot time. In any case, was the amount of time needed for answering the questionnaire the main reason or not, the answering process should be paid more attention to. Of course, the questionnaires were used only in the pilot test and the online service will be much different. Yet, the author suggests one way to facilitate the answering process of the science park managers. All the respondents could be given a list of the needed basic information for creating their profiles. This way someone else could first gather all the needed basic information before the actual respondent of the park would use the online service. This way the managers would save a lot of time and they would only have to concentrate on the – more difficult - strategic questions.

6.6 Applying Theory to Strategigram

The theory part of this study discussed the success of certain type of STP models. The section listed several ways to describe successful science park models. For example, it was reported that the study of the two world famous technology clusters, namely Silicon Valley and Route 128, shared some common elements. The existence of universities and large corporations as tenant companies, advanced research and specialisation was common to both of them. (Saxenian, 1985; Ylinenpää 2001, 3.) Next, the parks comprising the sample group are

examined. Those parks that share these elements are filtered and examined. The purpose is to examine if similar models have are found somewhere else and what other features this kind of parks would have. Of course, it should be kept in mind that Silicon Valley and Route 128 as much larger entities than just mere science parks. Nevertheless, the author wants to test if certain science park models can be searched from the profile database.

The author examined the eleven profiles of the sample group. The aim was to find those profiles that would match the criteria given in the example above. This would be something that the online service would allow the respondents to do. The limitations were following:

- Location and Environment axis: not part of university campus (excluded)
- Position in the Technology Stream axis: (+3) – (+10) (excluded)
- Target Companies axis: (-10) – (-3). (excluded)
- Degree of Specialisation axis: (+1) – (+10). (excluded)

The original weights were used in this analysis. These criteria excluded most of the parks and left only three parks. These parks were Turku Science Park, Tallinn's Tehnopol and Thailand Science Park. The profile of Technopolis resembled these profiles. Technopolis was excluded from this analysis because they were not able to answer all the questions and their profile was not complete.

Next, the profiles of these three parks were examined. FIGURE 6 represents the profiles of these three parks. The profiles of Turku and Tallinn seemed somewhat identical whereas the profile of Thailand differed a little bit from the two other ones. The main differences were the park's position in the technology stream and the target companies. The European parks were closer to markets. The European parks emphasised national companies whereas the Asian park emphasised regional companies. A common element to all the three parks was that they were located close to the equilibrium point in the seventh axis. In other words, their management model was neither institution nor market-driven but something in between. This feature was not defined in any way when these parks were filtered

from the sample group. This shows that by examining certain patterns one can find connections to other elements.

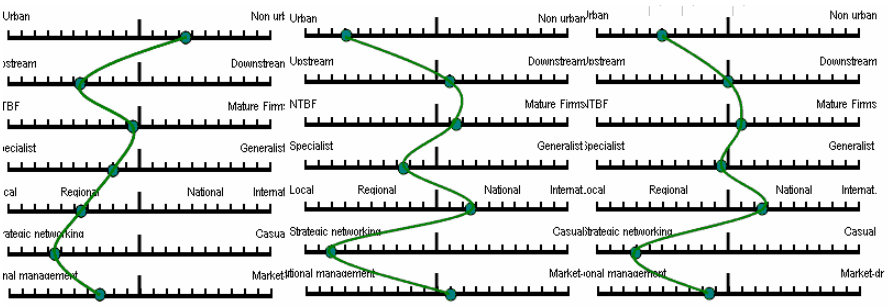

FIGURE 6. The profiles of Thailand, Turku and Tallinn (from left to right)

FIGURE 7 shows more clearly the similarities of these parks. Perhaps these two versions represent remotely the Asian and European versions of the Silicon Valley and Route 128 model. Maybe, this could be one way to classify science parks. In order to come up with better findings, a bigger database of profiles is needed. However, the sample group of eleven parks was already enough to find one pattern within Europe.

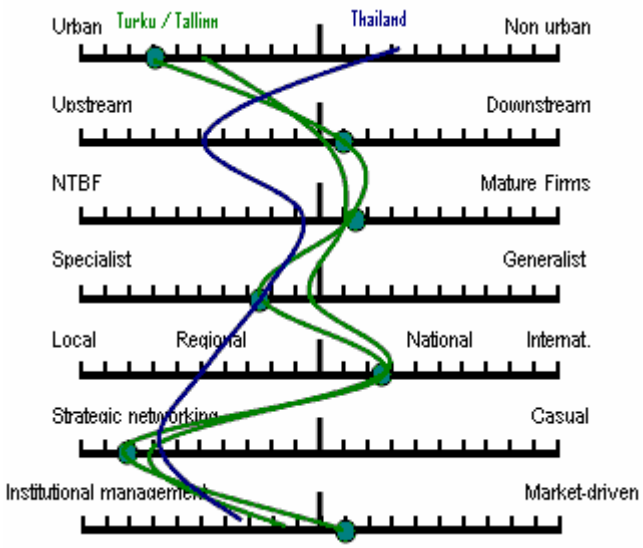

FIGURE 7. Similarities of the profiles of Turku, Tallinn and Thailand.

Turku is considerably bigger park than Tallinn. According to the answers in the questionnaires, Turku has 300 tenant companies whereas Tallinn has only 110 tenants. Yet, many of the ratios are very similar. TABLE 17 shows the similarities that the parks share. In spite of the difference in size, the parks are surprisingly similar. However, it was reported earlier that the number of technology centres of Tehnopol does not correspond to reality. The amount should be bigger which would increase the difference of the first ration in TABLE 17.

TABLE 17. Similarities of Turku and Tallinn.

RATIOS	TURKU	TALLINN
Tenant companies	300	110
Technology centres	7	3
Tenant companies : Technology centres	42,9	36,7
Companies in the incubator	30	12
Tenant companies : Incunatees	10,0	9,2
Tenant companies operating within the two largest sectors	140	50
Tenant Companies : comp. In 2 largest sectors	2,1	2,2

The composition of the Board of Directors is similar in both parks, that is, more than 50% of the members come from university, government and other public sector sources. Yet, the biggest differences are found from the management model axis. Turku seems to be a little bit more market-driven albeit they receive more funds from public sources than Tallinn.

How to apply these results then? Already exiting parks as well as new parks that aim at developing a specialised know-how cluster similar to Silicon Valley and Route 128 can find valuable information about to which direction their own park should go regarding the seven strategic axes. By first finding out their present position and comparing it to the ideal ones, it is easier for the management team to make the needed decisions in order to diminish the gap between the present situation and the ideal one. For instance, an already existing park could compare its own management model to the others'. The management model could be

changed so that it would better match the requirements of managing a know-how cluster. Naturally, the parks should come from similar socio-economic conditions. This was just an example, but it showed how profiles could be scrutinised.

6.7 Avoiding Performance Measuring

One of the main principles of the Strategigram is that it should not measure anything or rank the parks directly. Based on the interviews, this objective has not been fully achieved. Particularly the networking axis can easily be interpreted as measuring although it is argued that the axis is merely describing the way a park is networking. In the analysis part of the axes, the author recommended different kind of indicator to be used. This indicator would not count anything but would examine the reasons why the park is networking. It was also concluded, that although this kind of indicator would diminish the danger of being interpreted as measuring, it would not be completely objective. Thus, the author recommended both kinds of indicators to be used. This does not remove completely the wrong impression but it is a step to the right direction.

There were also two other axes that shared the same danger. The Location and Environment axis includes indicators that study the number of services offered. The more extra services are offered, the easier the park can attract skilled work force. Location inside a city – where all the services, educational institutes and living quarters are located – can be considered as a positive feature. On the other hand, location outside the urban area has it own benefits as well. Cheaper land, availability of land and possibly loose regulations may be the reasons why some parks have been established outside the urban area. Based on these facts, the danger of being interpreted as measuring is considerably smaller than on the sixth axis. Perhaps, an indicator that would be linked to the benefits of the non-urban parks could be added to the first axis. Such an indicator could take a look at, for example, the possibilities to expand the park.

The other problematic axis is the management model of the park. The other extreme – institution model – has negative connotations when compared to the other extreme – the market-driven model. This setting makes the institutional model extreme sound inefficient. However, it can be argued that only one of the indicators used in the axis can be linked to performance measuring. The respondents are asked the amount of the cash flows coming from public sources. The author claims that the seventh axis does not measure anything. Saying that by taking a look at the amount of cash flows coming from public sources any bigger conclusion about the performance of the park could be drawn would be too much of a generalisation. Thus, the author argues that the biggest problem is the names of the two extremes. The author wants to point out, as reported already earlier, that the nature and meaning of the axis should be explained better.

In the author's opinion all the possible actions should be done in order to avoid this problem. This would make the instrument more consistent. This way it would be easier for the target audience to accept the method.

6.8 Conclusions

Although the poor response rate first suggested that the Strategigram had not generated much interest among the science park managers, the personal interviews and questionnaires signaled something else. Those who had responded seemed enthusiastic about the instrument and were keen to participate the development process. Based on these experiences, the author argues that the main concern should be how to arouse more interest among the STP managers. As the author has already proposed in section 6.4, the Strategigram online service could be developed into something more comprehensive. The online service could function as a database including information on related subjects, such as, for instance, networking and different kind of management models. Moreover, perhaps the respondents could share their opinions and views about these subjects. This way, the Strategigram online service would not only give the possibility to compare different science park models but it would also provide valuable information about the past experiences of other parks and managers.

One of the reasons for the poor response rate could have been the length of the questionnaire. One respondent stated that answering all the questions had taken more than the promised twenty minutes. The number of questions should not be increased in any case. Of course, the pilot test was conducted by using questionnaires sent via e-mail. Whether the actual online service will be faster and easier to use is an important question. The respondents could be given in advance a document listing all the questions that have simple numeric answers. This way, someone else could gather all the numeric and non-strategic information needed for creating the profile before the respondent would use the online service. This could save a lot of the respondents' valuable time and could result better response rate.

The author tested different weights on some of the axes. Some of these changes clearly diminished the total discrepancy and was recommended. One important issue that came up in the interviews was that the respondents were not sometimes able grasp the main idea behind certain axes. Namely, axes five and seven caused quite a lot uneasiness and concern. The author claims that in order to make the Strategigram generally accepted among the science park managers, the descriptions and explanations on each axis must be improved. Examining other parks' profiles would not make any sense if the respondents did not know what these axes are all about.

As Keith Silverang stated the Strategigram is site specific and in the author's opinion it should remain as such. It should be pointed out to the respondents that such multi-site parks, as Technopolis, could be examined only one site at a time. Developing a model allowing the examination of multi-site parks would be too a demanding task. Moreover, it would make the Strategigram inconsistent. The same thing applied to the networked management model. It was concluded that the management model should be treated the same way. Each site and its management should be given its own profile if possible. However, the sample group included only one such park and thus no further examination was done.

6.9 Applicability of Results in Global Scale

The sample group changed during the research process. The author had carefully selected the ten parks of the original sample group from Finland, Sweden and Estonia. These parks came from both small and big cities and had different kind of emphases. The sample group even included one public limited company, which is not common among the science parks. However, the poor response rate forced the author to modify the sample group significantly. The original sample group had been selected so that the results could have been applied in global scale. Yet, the author argues that the new sample group was less homogeneous than the original one. TABLE 18 compares the new sample group to the global results of the IASP survey.

TABLE 18. Comparing Strategigram results to the IASP general survey 2006.

STRATEGIGRAM RESULTS		IASP GENERAL SURVEY 2006	
Inside a city	63,6 %		65,0 %
<100,000	14,3 %	Small city	41,2 %
100,000-500,000	42,9 %	Medium city	19,6 %
>500,000	42,9 %	Large city	39,2 %
Outside a city	36,4 %		30,0 %
		N/A	5,0 %
Percentage of private ownership		Ownership structure	
0	63,6 %	Public ownership	39,0 %
0.1 - 14.9%	9,1 %	Mixed (public + private) ownership	11,0 %
15 - 50%	9,1 %		
>50%	18,2 %	Private ownership	22,0 %
		N/A	28,0 %
Incubator(s) in the park		Incubator(s) in the park	
Yes	90,9 %		84,0 %
No	9,1 %		16,0 %
Park accepts companies from		The park is	
any technology sector	45,5 %	Generalist	35 %
any but encourages some	45,5 %	Semi-specialist	39 %
a limited number of sectors	9,1 %	Specialist	15 %
		N/A	11 %
Primary marketing objectives		Origin of the tenant companies	
Foreign companies	18,2 %	International	8 %
National companies	27,3 %	National	27 %
Regional companies	18,2 %	Regional	29 %
Local companies	9,1 %	Local	22 %
Others	27,3 %	N/A	14 %

These results from the survey of the International Association of Science Parks of 79 member parks around the world give some kind of an idea what the sample group should look like in order to truly reflect the whole global IASP member park population, that is, the target audience of the Strategigram. The TABLE 18 contains only a limited number of elements but all of them have similar distributions as the survey material. One of the few differences is the parks that are located in a city. The proportions of small and medium sized cities have minor variations. The parks come from four different continents, thus making the

sample group more global in comparison to the original sample group. TABLE 19 shows the geographical distribution of the new sample group.

TABLE 19. Geographical distribution of the new sample group.

Stockholms Teknikhöjd	Sweden	North Europe
Turku Science Park	Finland	North Europe
Technopolis	Finland	North Europe
Tehnopol	Estonia	North Europe
Thailand Science Park	Thailand	Asia Pacific
Fundación Parque Científico y Technológico de Albacete	Spain	South Europe
Research Park North Carolina	USA	North America
Fundación Innova	Spain	South Europe
Manchester Science Park Limited	UK	Central Europe
Corporación Parque Technológico Sartenejas	Venezuela	South America
Scion DTU a/s	Denmark	North Europe

North Europe	45,5 %
Central Europe	9,1 %
South Europe	18,2 %
Europe	72,7 %
North America	9,1 %
South America	9,1 %
Asia Pacific	9,1 %

Based on the two tables above, the author claims that sample group used in this can be compared to the whole population, that is, the member parks of the IASP. It is acknowledged that the majority of the sample group parks come from Europe. This is clearly a weakness of this sample group. Whether the parks outside Europe differ a lot from the European ones is an important question. If they do, another pilot test outside Europe is recommended. Otherwise, the next step should be – in the author's opinion - launching the Strategigram online service and making the needed adjustments during this process. Of course, there are probably many special cases that were not detected in this study but finding out them all would have required going through the whole population.

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8 APPENDICES

Strategigram questionnaire (APPENDIX 1)

Results of the original weights (APPENDIX 2)

SCIENCE AND TECHNOLOGY PARKS STRATEGIGRAM
4th April 2006
Luis Sanz (Director General – IASP)

Strategigram Survey

Thank you for having accepted to help us with the development of a new Science Park modelling tool. The Strategigram is a methodology created and developed by Luis Sanz, Director General of the IASP.

Before we launch the *Strategigram*, we need to test it in order to detect and solve potential problems and to fine tune its indicators. Your Park is part of this pilot test.

A few words about the Strategigram

The Strategigram is a tool that will allow STP[1] managers to have a broader and deeper understanding of their overall strategy on the one hand, and to conduct meaningful and selective benchmarking on the other, since it will enable every Park to identify which STPs in the world have the same or similar strategic profile, in other words, those that share the same "strategic model".

It is very important to be aware that the Strategigram does not measure results or performance: the Strategigram can't tell anybody whether he is doing 'well' or 'bad', and does not intend to.

The Strategigram graphically represents the strategic model (profile) of your STP, and gives you the chance to reflect upon it, as well as to check the strategic profile of other STPs in the world. In the course of time, the Strategigram will also enable to you follow and 'visualise' any changes or evolution in your strategy.

In other words, the Strategigram may be a very useful analysis and knowledge-acquiring tool.

The Strategigram, now at the final stages of its development, will be an online tool at the disposal of all IASP members, and it will consist of a nice software programme allowing four interesting exercises:

- Outline your own strategic profile.
- Compare it with the profiles of other STPs.
- Follow the eventual changes and evolution of your strategy.

[1] STP = Science and Technology Park

- Simulate strategic profiles – *"How would my strategigram look like if I took this or that decision?"*

What to do next?

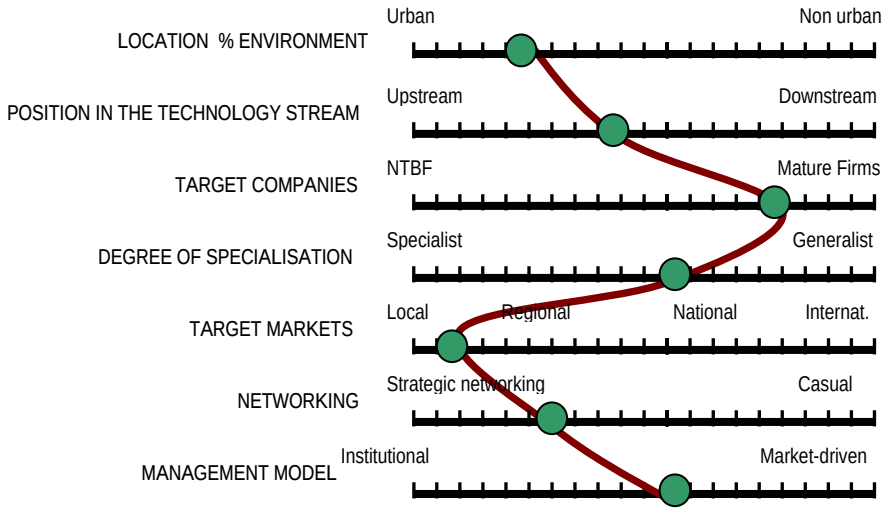
Before we launch said software we need your help. In the following pages you will find a questionnaire, which you can compile by checking the adequate boxes or typing in the answers.

Please answer the questionnaire and e-mail it back to sanz@iasp.ws by the 12th April of this year.

Shortly after receiving your answers, we will send you back your Strategigram, that is, the graphic of the strategic profile of your Park, including explanations and comments about how did we obtain that result, and the meaning of its different parts.

Finally, we will contact you to fix an appointment for a telephone conversation to ask you some additional questions about the Strategigram methodology and to get your comments and inputs about the strategic profile of your Park (basically we'll need to know if you recognise yourself in the "picture" depicted by the Strategigram or if you think that the picture obtained does not reflect your strategic profile accurately enough).

If you haven't yet seen any of my presentations about the "strategigram", you may wonder what it looks like. Here is an example, so that you know what to expect:



Pilot-tests are being conducted in Argentina, Denmark, Estonia, Finland, Spain, Sweden, Thailand, Venezuela, and the UK.

ACKOWLEDGEMENTS

In the development of this methodology I have had the valuable help of **Mika Vikström** from the Lahti University of Applied Sciences (Finland), who worked as an intern at the IASP in 2005. The questionnaire's structure is part of his Bachelor's Thesis. The Bachelor's Thesis examines the potential of the Strategigram and participates in its overall development.

For the development of the Strategigram software, I have the support of **Carl Rogers** from the Aston Business School, in Birmingham (UK), who is at present carrying out an internship at the IASP Headquarters.

I also whish to thank **Fernando Cabrero**, who is preparing a doctoral thesis about the Strategigram and its applications and findings, at the Polytechnical University of Valencia (Spain).

Questionnaire

The following information is needed for creating the strategigram of your STP. Please answer the questions, save the document and return it via e-mail to sanz@iasp.ws

Your additional comments at the end of the document are also of the greatest importance!

Answering the questionnaire should take approximately 20 minutes. The questions concern the following strategic axis:

Axis 1: LOCATION AND ENVIRONMENT
Axis 2: POSITION IN THE TECHNOLOGY STREAM
Axis 3: TARGET COMPANIES
Axis 4: DEGREE OF SPECIALISATION
Axis 5: TARGET MARKETS
Axis 6: NETWORKING
Axis 7: MANAGEMENT MODEL

Axis 1: LOCATION AND ENVIRONMENT

1.1. Is your Park inside a city?
Please check only 1 answer

☐ Yes ☐ No

If you answered YES, please answer these 2 questions

1.2. What is your city's population?
Please check only 1 answer.
- ☐ > 500,000
- ☐ 100,000-500,000
- ☐ < 100,000

1.3. Does your Park have housing or residential zones specifically designed for tenant companies and their employees?
Please check only 1 answer.
- ☐ Yes
- ☐ No

If you answered NO, please answer these 4 questions

1.4. What is the distance from your Park to the nearest city?
Please check only 1 answer.
- ☐ >50 km
- ☐ 10-50km
- ☐ <10 km

1.5. What is the city's population?
Please check only 1 answer.
- ☐ >500,000
- ☐ 100,000-500,000
- ☐ <100,000

1.6. Does your Park have housing or residential zones, inside or adjacent to the Park, specifically designed for tenant companies and their employees?
Please check only 1 answer.
- ☐ Yes
- ☐ No

1.7. Are there other residential zones or a housing offer within 5km from your Park? Please check only 1 answer.
- ☐ Yes
- ☐ No

1.8. Does your Park have leisure centres (restaurants, pubs, cafeterias…) open after working hours?
We wish to know whether within your Science Park there are leisure places where the staff of your tenants may go to relax and socialise after work. Eventual such places near the Park, but not within the Park itself do not count for the purpose of this question.
Please check only 1 answer.
- ☐ Yes
- ☐ No

1.9. Please state which of the following services your Park provides:
Check as many boxes as required.
- ☐ Sports and fitness (sport centres, gyms, swimming pools, jogging circuits…)
- ☐ Cultural services (libraries, cinemas, theatres…)
- ☐ Shops, commercial centres…
- ☐ Social services (child care, health care centres, schools..)

Axis 2: POSITION IN THE TECHNOLOGY STREAM

2.1. Which statement applies to your Park? Please check only 1 answer.

- ☐ My Park is located on a university campus or adjacent to it.
- ☐ My Park is on university owned land, but not on campus or adjacent to it.
- ☐ My Park is not located on university owned land and is not adjacent to a university

2.2. What percentage share holding (ownership) do Universities and Companies have in your STP?

(For the purpose of this question, we are not concerned with share holders other than Universities or private companies. We do not require information on other share holders such as governments, etc.)

Universities (Higher Education Institutions): Please check only 1 answer.	Private companies / private investors: Please check only 1 answer.
☐ >50%	☐ >50%
☐ 15-50%	☐ 15-50%
☐ 1-14%	☐ 1-14%
☐ 0%	☐ 0%

2.3. The General Manager (or equivalent) of your Park is mainly:

(We are inquiring about the main professional experience or career of the Park's manager before taking over this position). Please check only 1 answer.

- ☐ An Academic
- ☐ A Civil Servant (worked for Governments / Public Administrations)
- ☐ A Business Professional (worked for privately owned companies)
- ☐ Other (Please Specify): ____

2.4. Is there a University-Industry Liaison Office located within your Park?

These offices receive different names in different parts of the world, and are sometimes referred to as Technology Transfer Office, OTRI, etc. Regardless of their name, we refer to formally existing departments or teams dedicated to commercialise the research results of universities.

Please check only 1 answer.

- ☐ Yes
- ☐ No

2.5. How many Tenant Companies does your Park have?

(Please count only those tenants that are private companies / businesses, including those that may be in the incubators of your park. Please do not count tenants that are government agencies or departments, or other institutional tenants. Please do not include the Technology or R&D centres, which we will ask about in later questions).

Type in here: ____

2.6. How many Technology Centres does your Park have?

By Technology Centres we refer to the different centres and institutions dedicated to conduct research and development activities, and that are not private businesses, but rather public centres (for example linked to universities), or centres fostered by industries (or industry associations) in a specific sector. They are also often referred to as Technology Institutes, R&D Centres, etc.

Type in here: ____

2.7. How many people are employed by your tenant companies?

(Please do not count the employees of the Technology Centres or the STP administrative staff, but only the employees of your tenant private businesses)

Type in here: ____

2.8. How many people are employed within the Technology Centres of your Park?

Type in here: ____

2.9. How many of your tenant companies have their own R&D units in the Park?

Type in here: ____

Axis 3: TARGET COMPANIES

3.1. How many Incubators are in your Park? Please check only 1 answer.
- ☐ 0
- ☐ 1
- ☐ 2
- ☐ > 2

3.2. Which of these statements applies to your Park? Please check only 1 answer.
- ☐ All incubators in our Park are managed by ourselves (the Park's management team)
- ☐ All incubators in our Park are managed independently (not by ourselves)
- ☐ Some incubators in our Park are managed by ourselves and others independently
- ☐ We have no incubators

3.3. How many companies (incubatees) are tenants of the incubators in your Park?

Type in here: _____

3.4. How many staff does your Park management company / team have?

Type in here: _____

3.5. How many staff do the Business Incubators in your Park have?
If any of the Incubators staff are also part of the Park management company, please include them here as well (even if you have already counted them in the previous question).

Type in here: _____

3.6. Does your Park have its own Seed Capital Fund? Please check only 1 answer.
- ☐ Yes
- ☐ No

3.7. Does your Park have agreements with other Seed Capital Funds or similar financial tools to support New Technology Based Firms (startups, etc.)? Please check only 1 answer.
- ☐ Yes
- ☐ No

Axis 4: DEGREE OF SPECIALISATION

Please DON'T use this column

4.1. Which of these statements best applies to your Park?
Please check only 1 answer.

Providing that they meet our general requisites:

☐ We accept companies and institutions from any technology sector.

☐ We accept companies and institutions from any technology sector, but we encourage some specific sectors more that others.

☐ We only accept companies and institutions from a limited number of technology sectors.

If you checked the answer above, please continue here

If you checked the answer above, please answer this question

4.2.A. How many sectors do you encourage?
Type in here: _____

If you checked the answer above, please answer this question

4.2.B. How many sectors do you admit in your Park?
Type in here: _____

4.3. Do any of the incubators within your Park specialise in a technology sector?
Please check only 1 answer.
☐ Yes
☐ No

4.4. How many Tenant Companies operate within the largest technology sector present in your Park?

Type in here: _____

4.5. How many Tenant Companies operate within the second largest technology sector present in your Park?

Type in here: _____

4.6. How many Technology Centres does your Park have operating within your two largest technology sectors? Please check only 1 answer.
☐ 0
☐ 1-2
☐ >2

4.7. Does your Park have facilities / infrastructures dedicated to specific technology sectors? Please check only 1 answer.
☐ Yes
☐ No

4.8. Does the management team of your Park have experts or specialists in some of the technology sectors that you specialise in? Please check only 1 answer.
☐ Yes
☐ No

Axis 5: TARGET MARKETS

5.1. Which of these is your current primary marketing objective?
Please check only 1 answer.

- ☐ To attract foreign companies or Multinationals.
- ☐ To attract national companies.
- ☐ To attract regional companies
- ☐ To attract local companies.
- ☐ None of the above (please specify): _____

5.2. Of your Tenant Companies, which is the breakdown according to its origin?
Please type in the number of companies in each group: (?)

Local (based in your city): _____

Regional (based in your region or province): _____

National (based in your country): _____

Foreign (based abroad): _____

Multinationals: _____

5.3. Where do you spend your marketing budget?
(Please select only 1 answer in any relevant column):

Locally	Regionally	Nationally	Abroad
☐ 0%	☐ 0%	☐ 0%	☐ 0%
☐ 1-25%	☐ 1-25%	☐ 1-25%	☐ 1-25%
☐ 26-50	☐ 26-50	☐ 26-50	☐ 26-50
☐ 51-75%	☐ 51-75%	☐ 51-75%	☐ 51-75%
☐ >75%%	☐ >75%%	☐ >75%%	☐ >75%%

5.4. Does your Park have any office, delegation or representative in another location, dedicated to marketing activities?
Please do not count offices or delegations whose main purpose is for lobbying, or for obtaining funding and subventions, instead of promoting your Park and attracting companies to it.

Please check only 1 answer.

- ☐ No
- ☐ Yes, elsewhere within the country
- ☐ Yes, abroad

Axis 6: NETWORKING

6.1. On average, how many conferences, symposiums, etc., does your Park organise or host annually?
Please check only 1 answer.

☐ 0
☐ 1
☐ 2
☐ 3
☐ >3

6.2. On average, how many conferences, symposiums, etc., do you or other representatives or your Park attend annually?
Please check only 1 answer.

☐ 0
☐ 1
☐ 2
☐ 3
☐ >3

6.3. How many formal networks does your Park belong to?
By "formal" network we mean networks that have an established admission process and some form of legal recognition and membership fees, such as associations, etc. (example: IASP, which has a full legal identity), or at least some form of identity and separate existence, even if they are not subject to membership fees.

Please check only 1 answer.
☐ 0
☐ 1
☐ 2
☐ 3
☐ >3

6.4. Is your Park the leader of one or more associations or networks?
A STP is considered a 'network leader' if it meets one or more of the following conditions:

- It hosts the Head Office of a network or association.
- It directly manages a network or association.
- A representative of the Park is part of a network or association Board or Committee.

Please check only 1 answer.

☐ Yes
☐ No
☐ Other situation (please describe): _____

6.5. Please give an estimation of how many informal networks your Park participates in.
By "informal" network we mean those that have no legal identity, are not subject to membership fees and do not have established admission procedures apart from the will and intent to participate. We leave it to your judgement to determine what you consider an "informal" network to be.

Please check only 1 answer.
☐ 0
☐ 1
☐ 2
☐ 3
☐ >3

6.6. How many agreements or strategic alliances has your Park signed which are currently active?
We mean alliances or agreements that imply some degree of formality and commitment, and which have specific goals, such as those deriving from Memorandums of Understanding (MOUs) or the like. For the purpose of this question, membership to an association does not constitute an MOU or

alliance.

Please check only 1 answer.

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ >2

6.7. How often does your Park run programs and activities to enhance the networking and cooperation between tenants? Please check only 1 answer.

- ☐ Never
- ☐ Weekly
- ☐ Monthly
- ☐ Bi-monthly
- ☐ Quarterly
- ☐ Annually

6.8. Additionally, how many different types of these networking events does your Park organise?

In this question we are not concerned about the frequency with which events take place, but about the different kinds of events that you organise (for example: breakfast meetings, cultural events, sport activities, informative seminars, etc.)

Please check only 1 answer.

- ☐ 0
- ☐ 1 type
- ☐ 2 types
- ☐ >2 types

6.9. Has your Park implemented any IT-based tools to facilitate networking between tenants?

For the purpose of this question, the existence of WiFi areas does not constitute an IT-based tool meant to facilitate networking. We are rather thinking of tools such as specific Park intranets, chat forums, interactive news boards, etc.

Please check only 1 answer.

- ☐ Yes
- ☐ No

6.10. Does your Park have specific tools, programmes or personnel to support the international contacts and networking of your tenant companies?

Please check only 1 answer.

- ☐ Yes
- ☐ No

6.11. Please indicate which statement reflects your situation regarding networking in your Business and Strategic Plans? Please check only 1 answer.

- ☐ Networking is not considered.
- ☐ Networking is considered in a section along with other activities.
- ☐ Networking has its own section.

6.12. Please indicate which statement reflects your situation regarding networking in your Annual Budget? Please check only 1 answer.

- ☐ There is no budget for networking.
- ☐ Networking is included as a part of a larger budget (not separately).
- ☐ Networking has its own budget.

6.12. What percentage of your Annual Budget is solely dedicated to networking?

Please check only 1 answer.

- ☐ < 5%
- ☐ 5-9.99%
- ☐ 10-20%
- ☐ >20%

Axis 7: MANAGEMENT MODEL

7.1. What is the nature of the body that manages your Park? Please check only 1 answer.

- ☐ It is an established company
- ☐ A government department
- ☐ A University department
- ☐ A public Foundation
- ☐ A private Foundation
- ☐ Other (please specify): _____

7.2. What percentage of the Park's managing body (or equivalent organisation) is owned by private companies / investors? Please check only 1 answer.

- ☐ 0%
- ☐ 0.01-10%
- ☐ 10.01-20%
- ☐ 20.01-30%
- ☐ 30.01-40%
- ☐ 40.01-50%
- ☐ >50%

7.3. Is your Park's managing company listed on the stock market?
Please check only 1 answer.

- ☐ Yes
- ☐ No

7.4. What percentage of your Park's cash flow comes from government or other publicly owned institutions? Please check only 1 answer.

- ☐ 0%
- ☐ 0.01-19.99%
- ☐ 20.00-39.99%
- ☐ 40.00-59.99%
- ☐ 60.00-79.99%
- ☐ 80.00-99.99%
- ☐ 100%

7.5. What is the composition of your Board of Directors (or equivalent body)?

Total number of Directors on your Board: _____

How many of them come from the public sector (governments, etc.)? _____
How many from the Academy / University? _____
How many from the private sector (companies, etc.)?: _____
How many from other sectors? _____

(Let us ask again one of the questions asked in Axis 2)

7.6. The General Manager (or equivalent) of your Park is mainly:
(We are inquiring about the main professional experience or career of your Park's manager before taking over this position)

Please check only 1 answer.

☐ An Academic
☐ A civil servant (works for governments / Public Administrations)
☐ A Business Professional (work
☐ Other (Please Specify): _____

7.7. Besides the salary, are there performance-related incentives for the Park's General Manager (or other members of the Park's staff)?
Please check only 1 answer.

☐ Yes
☐ No

You're almost finished!

Just a few more boxes to check (easy ones). Please keep going.

Self Perception

We are now asking you to erase from your mind all the previous questions that you so generously answered, and to let us have your view on the position that your Park would occupy on the strategic axes that configure the strategigram.

On the next page you'll find a representation of all 7 axes. Please select only one checkbox from each axis. Keep in mind that all the positions on each axis represent degrees of emphasis, except the position 0 which represents a perfect balance between the two extremes. In other words, even if any one should check the boxes +10 or -10 on some of the axes, it would not mean that the other extreme of the axis is not at all present in the Park's activities. It only means that there is a clear priority or emphasis on what that particular end of the axis represents.

For example, if someone were to check +10 on the 2nd axis (Position in the Technology Stream), does not necessarily mean that the Park works only with companies and pays no attention at all to the university or to the research activity. It just means that the main focus is working with companies, and that the work with universities or research centres is less central (but of course existent).

If you consider that your Park pays equal attention to both extremes of a given axis, the answer should be then zero.

Please bear in mind that the figures themselves are used only for indicating a relative position on the axis. **In other words, there are no negative connotations whatsoever attached to the left side of the axis (the minus figures).**

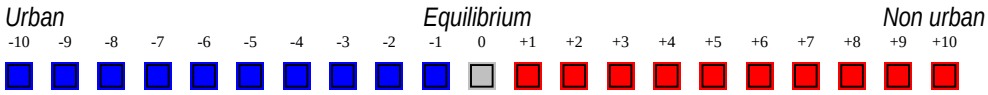
1. LOCATION AND ENVIRONMENT:

This axis looks at both the geographical location of the park with respect to the city as well as to a number of other things that may affect the "urban density" of the park. "Urban density" results not only from the geographical location but also from a number of other elements that contribute making the park not only a place where people go to work. This includes making it a place or an environment where people may choose to stay for longer periods and to engage in other activities outside of work, for instance, leisure or cultural activities.

The presence of residential areas or leisure facilities may then increase this "urban density" even if a park is not located in a city.

Therefore, the expressions "urban" and "non-urban" on the two extremes of this axis must be interpreted in the broader sense described above and not only from a purely geographical point of view.

Where do you see your Park on this axis? Please check one box only.



Additional comments: _____

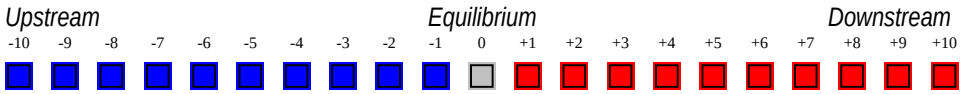
2. POSITION IN THE TECHNOLOGY STREAM:

This axis seeks to reflect the degree of emphasis that parks place on technology and knowledge "producers" versus technology "receivers/users", or vice versa.

As we all know some parks' first priority is to work with and for universities and university departments (upstream), trying to facilitate the transfer of the research results into the market place, where as others concentrate most of their activities indirectly working with the industry and the markets (downstream).

Of course, we take for granted that in either case, the parks work with both sides, and that the position on the axis only indicates priorities or emphasis. If we had a park working exclusively with a university and not at all with companies, then it would hardly be a science park, but merely some department of the university or at best a university liaison office. Likewise, should a park work only with companies and have no relation whatsoever with a university, we would be talking of a mere business park or simple real estate operation with no further ambitions.

Where do you see your Park on this axis? Please check one box only.



Additional comments: _____

3. TARGET COMPANIES:

This axis seeks to determine whether the main emphasis of a park is more on fostering the creation of new companies (New Technology Based Firms [NTBF]) or rather to support companies that already exist and have reached a certain degree of consolidation. In other words, the axis should let us know the relative importance of incubation and activities encouraging start ups.

In most cases, parks will pay attention to both types of companies (start up and mature firms), although there might be cases where a park works exclusively on one end of the axis or the other.

Where do you see your Park on this axis? Please check one box only.

New Technology Based Firms *Equilibrium* *Mature Firms*

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Additional comments: _____

4. DEGREE OF SPECIALISATION:

This axis refers to the eventual specialisation of parks in some specific sectors (specialists). As we know, some parks are completely specialised in one or very few sectors whereas others permit activities from any sector (generalists) provided that they meet the usual requisites related to technological level, innovation and other all quality that are typical of science parks.

In between these two clearly opposite positions we find many parks that whilst accepting activities from any sector may favour and encourage some of them over others.

Where do you see your Park on this axis? Please check one box only.

Specialist *Semi-specialist* *Generalist*

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Additional comments: _____

5. TARGET MARKETS:

Besides establishing their commercial priorities regarding the type of companies that they want to attract, parks must also set priorities regarding the markets that they want to focus on. This axis will determine such priorities, telling us whether a park is mainly concerned with attracting companies from its own local/regional environment or whether it emphasises wider markets (national or international).

Where do you see your Park on this axis? Please check one box only.

Local *Regional* *National* *International*

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Additional comments: _____

6. NETWORKING:

In some manner all parks engage in networking activities; for some parks however networking may have become a central issue whereas for others it is not as important. Also the way in which parks network may differ greatly. For some parks networking follows clear patterns and procedures and might even have its own specific budget and human resources, or at least clearly defined targets and objectives. Other parks approach the whole topic in a more spontaneous and casual way depending on the circumstances and the opportunities of the moment.

In principle, both approaches may produce interesting results, but they certainly imply a different strategic approach altogether, which this axis seeks to visualise.

Where do you see your Park on this axis? Please check one box only.

Strategic Networking *Casual Networking*

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Additional comments: _____

7. MANAGEMENT MODEL:

Beyond the mere description of the ownership model for parks (resulting in a flat ‘public, private, mixed ownership’ schemes) we aim at establishing models or “styles” of managing science parks. To do this a combination of indicators must be taken into account.

Please be aware that neither extreme of this axis (‘institutional’ or ‘market driven’ model) implies that one is preferential to the other. By “management model” we mean something that goes beyond the mere ownership structure. In other words, the fact that the park may be owned by public administrations, private companies

or a mix of both will probably influence the position of that park on this axis, but is not the sole element that will determine it.

However, the many nuances involved in the concepts that configure this axis, and the fact that this is now a pilot test, invite us not to give any further explanations about the connotations attached to the expressions that circumscribe the axis. We would rather leave it entirely up to your interpretation. We will have a chance to discuss this after you have completed this questionnaire.

Where do you see your Park on this axis? Please check one box only.

Institutional Model *Market Driven Model*

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7 +8 +9 +10

Additional comments: _____

And now one final question.

How important do you find each of these issues to understand the strategy of a Park?

Axis 1: Location and Environment

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 2. Position in the Technology Stream

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 3. Target Companies

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 4: Degree of Specialisation

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 5: Target Markets

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 6: Networking

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

Axis 7: Management model

Not at all imp. ☐ Not really important ☐ Somewhat important ☐ Important ☐ Very important ☐ I do not know ☐

And how useful do you think that this whole methodology may be to eventually come out with a classification of Park models based on strategic criteria?

Not at all useful ☐ Not really useful ☐ Somewhat useful ☐ Useful ☐ Very useful ☐ I do not know ☐

Additional comments: _____

Thank you for your answers and your time!

APPENDIX 2

Results of the original Strategigram weights.

Park	Axis 1			Axis 2			Axis 3		
	S	P	D	S	P	D	S	P	D
Stockholm	-4,5	1	5,5	6,0	-5	11,0	-6,0	-5	1,0
Turku	-7,0	-9	2,0	1,0	-9	10,0	1,5	-6	7,5
Helsinki	-2,5	0	2,5	4,0	0	4,0	-2,0	-7	5,0
Tallinn	-5,0	-7	2,0	0,0	0	0,0	1,0	3	2,0
Thailand	3,5	-2	5,5	-4,5	0	4,5	-0,5	0	0,5
Albacete	-6	-9	3,0	-8,5	0	8,5	-3	-3	0,0
North Carolina	-2	-5	3,0	-1	1	2,0	-1	5	6,0
Valencia	-8	-9	1,0	-10	-10	0,0	-4	-8	4,0
Manchester	-5,5	-8	2,5	1	0	1,0	10	-4	14,0
Sartenejas	-5,5	6	11,5	-7,5	0	7,5	-10	-7	3,0
Scion	-2	-8	6,0	-4	3	7,0	-2	2	4,0
Average			3,7			4,6			3,9

	Axis 4			Axis 5			Axis 6			Axis 7		
	S	P	D	S	P	D	S	P	D	S	P	D
Stockholm	6,0	3	3,0	-7,5	-5	2,5	-5,0	0	5,0	-3,0	7	10,0
Turku	-2,5	-3	0,5	2,5	-7	9,5	-8,0	-7	1,0	1,0	-5	6,0
Helsinki	4,5	8	3,5		8		-9,0	-8	1,0		5	
Tallinn	-0,5	-3	2,5	2,5	6	3,5	-7,0	-8	1,0	-1,5	-6	4,5
Thailand	-2	0	2,0	-4,5	0	4,5	-6	-3	3,0	-3	5	8,0
Albacete	-2	-5	3,0	-5,5	0	5,5	-6	-5	1,0	-8	0	8,0
North Carolina	4	3	1,0	0	8	8,0	-5	-5	0,0	2	6	4,0
Valencia	-5	0	5,0	-9	0	9,0	-6	-5	1,0	-5	-8	3,0
Manchester	4,5	7	2,5	-8,5	7	15,5	-4	-9	5,0	4	9	-5,0
Sartenejas	5	10	5,0	-4	-3	1,0	-2	8	10,0	0	8	8,0
Scion	-1	2	3,0	2,5	4	1,5	-5	0	5,0	-2	8	10,0
Average			2,6			5,5			2,8			5,1

S = Strategigram score
P = Self perception
D = Discrepancy

Unable to answer all questions

Discrepancy within allowed limits (0 - 4)