

Intellectual Capital Report for the Kista Cluster

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1. Intellectual Capital Report for the Kista ICT Cluster: Motivation and Methodology

Kista is Sweden's biggest success story as far as industrial clusters are concerned. The story of Kista begins in the 1960s while Swedish innovation policy could be described as blurry at best. It all started as a municipal planning scheme to create new integrated areas, combining industrial activity and living spaces, in green field areas around Stockholm. At the time Stockholm was home of several electronic manufacturing firms seeking to expand, that decided to locate their business in Kista, thus affecting the future of the region. The municipality started promoting Kista as an electronic industry location. City authorities took an extra step by regulating access to the region and allowing only electronic industry firms to locate in it. Ericsson moved some of its manufacturing activities in the region and was soon followed by other major enterprises such as Motorola and General Electric. This high concentration of high-tech industries created a considerable demand for engineers and KTH - Kungliga Tekniska Högskolan [Royal Institute of Technology] established a local section. This trend continued with many firms relocating from other locations within the Stockholm area to Kista. In the 1990s Kista grew remarkably acquiring a highly specialized profile as the "WAP centre of Wireless Valley", attracting most of the major global actors of the industry. The coexistence of all these enterprises in a limited geographic area helped in the creation of a highly specialized core of locally embedded knowledge. Once the hopes concerning the future of third generation mobile phones were proven void a lot of the major players in Kista were forced to scale down and move out of the region creating the conditions for Kista's transformation into a major ICT cluster. With a lot of available office space and a great knowledge based infrastructure a lot of ICT SMEs found Kista increasingly attractive and chose to move in as the old major corporate actors were moving out. Kista went through a period of incredible growth based on a new strategy of diversification and entrepreneurship rather than specialization.

Today Kista Science City extends across four municipal districts around Järvafältet, all of which have agreed on a joint vision for the future. Not only does this involve working together to encourage business growth and higher education, but also to improve housing, traffic networks, local traffic services and other infrastructures. The business community, the universities and the local authorities have worked together to produce and promote a strong vision for the future, with the focus on the development of Kista into a Science City. Approximately 28000 people are working in 700 companies in the Kista center alone. Two thirds of them work in the ICT sector.

Kista has world-leading companies along the entire length of the wireless systems value chain. A very strong position in research and development in connection with microelectronics, optics and so on, linked to areas such as broadband systems. A joint focus is to build an international growth area within mobile services.

There is no one particular organization, company or authority that is responsible for developments in Kista. The secret lies in having lots of players striving together towards the shared vision for Kista.

The goal of Kista Science City is to stimulate growth. It strives to provide an ideal environment for close cooperation among the business community, the City, the University and the neighboring local authorities for sustainable growth. Kista Science City's ambition is to become a source of important scientific and industrial output as well as an ideal living and recreational area, a goal that has already been achieved to some degree.

It is the objective of this intellectual capital report to describe the Kista ICT cluster in its present form. By doing this, it aims at depicting those elements that contribute to the network's success: The know-how of dedicated members, appropriate structures for the exchange of

information and knowledge as well as good relations with relevant partners within the Region and beyond.

What is Intellectual Capital Reporting?

Intellectual capital reports analyse and assess the intellectual capital of organisations. Intellectual capital is commonly considered to have three dimensions:

- Human capital: the knowledge members of an organisation bring with them. It includes peoples' skills, experiences and abilities.
- Structural capital: the opportunities and instruments that serve the exchange and documentation of knowledge (IT, intellectual property, organisational culture, process organisation etc.).
- Relational capital: all resources linked to the external relationships with customers, suppliers and the public.

Intellectual capital reports complement conventional financial reporting. They focus on intangible assets – aspects that are of increased importance in times of the service society and knowledge economy.

Intellectual capital reporting has been developed as a private sector management tool in the mid 1990s in Sweden. Meanwhile this methodology has spread throughout Europe.¹ Its use in the context of regional networks is a new field of application, though. Here the RICARDA project undertakes pioneering work.

The RICARDA Project

The process of drafting an intellectual capital report for the Kista ICT cluster took place in the context of the EU-financed project RICARDA (Regional Intellectual Capital Reporting – Application and Development of a Methodology for European Regions). This project focuses on the pilot-application of the method of intellectual capital reporting for regional technology oriented networks. This objective is implemented in four exemplary networks in the regions of Stuttgart (Germany), Styria (Austria), Stockholm (Sweden) and West-Transdanubia (Hungary). VDC is the study case for the Stuttgart Region.

Project coordinator is the German Institute of Urban Affairs (Deutsches Institut für Urbanistik, Difu), Berlin, the non-profit-making research and consulting institution of the German cities. RICARDA is supported with funding from the 6th European Framework Programme for Research and Technological Development („Knowledge Regions 2“).²

The project's consortium brings together eight partners from these four European regions, representing a wide spectrum in terms of regional institutional capacities, economic structures and R&D priorities. The participating regional institutions are all actively involved in cluster-development activities. The consortium's four research institutes are all working in the field of regional RTD policy and cluster management.

Members of the consortium are:

- Deutsches Institut für Urbanistik (Difu), Berlin (D)
- Wirtschaftsförderung Region Stuttgart GmbH (WRS) (D)
- Offices of the Province of Styria (Steiermark), Graz (A)
- JOANNEUM RESEARCH Forschungsgesellschaft mbH, Graz (A)
- Kista Science City AB (Kista), Stockholm (S)
- Royal Institute of Technology (KTH), Stockholm (S)
- West Pannon Regional Development Agency (WPRDA), Sopron (HU)
- West Hungarian Research Institute of the Centre for Regional Studies (WHRI), Győr (HU)

¹ See European Commission (2006): Reporting Intellectual Capital to Augment Research, Development and Innovation in SMEs. Report to the Commission of the High Level Expert Group on RICARDIS.

² Further information in the internet under <http://www.ricarda.org>.

Why Intellectual Capital Reporting for Regional Networks?

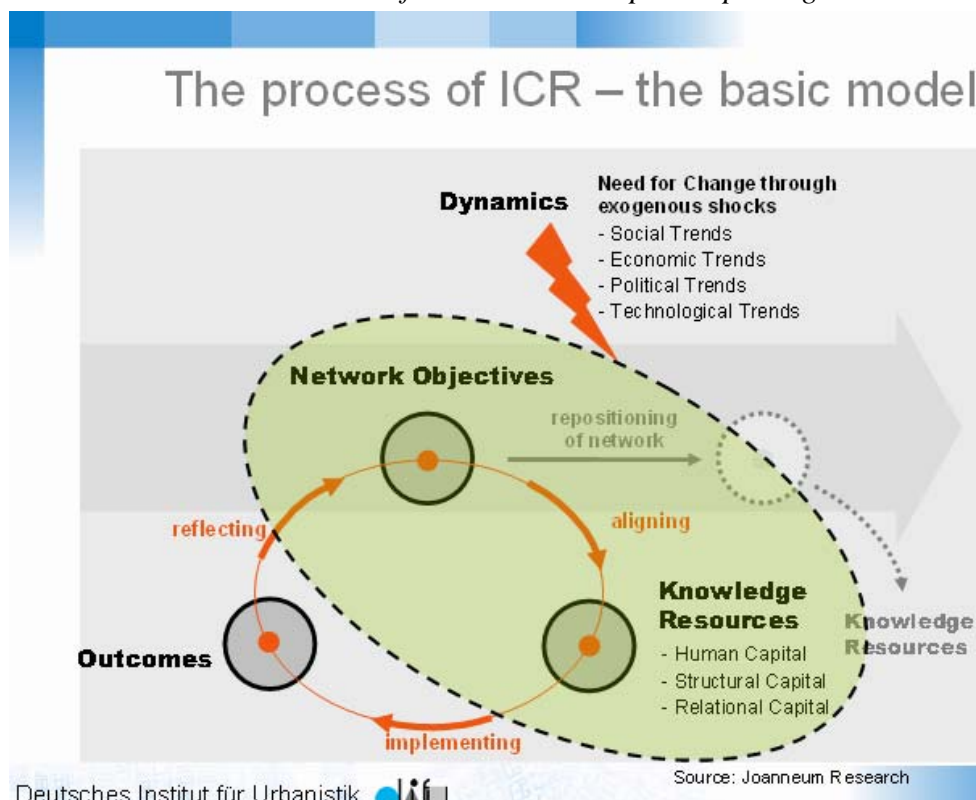
It is quite obvious to transfer the method of intellectual capital reporting from the company level to regional, technology-oriented networks like Kista. The following considerations and inputs from practitioners were prominent at the start of the project:

- **Methodological focus:** Intellectual capital reports focus on the most important elements of cluster initiatives, i.e. the generation and distribution of knowledge.
- **Team-oriented process:** An intellectual capital report amalgamates the objectives and assessments of an organisation's members. This team-oriented design suits the character of a network as this consists of partners enjoying equal rights.
- **Management tool:** The identification and assessment of a network's intellectual capital with the help of appropriate indicators can support those actors in charge of strategic and operational issues (e.g. board of directors, network manager) with regard to targeted interventions. A periodic repetition of intellectual capital reporting makes it possible to measure changes regarding these indicators.
- **Network development:** Many networks have been established in the last couple of years and are now going through a phase of maturity, in which the review of the network's objectives and success factors is of growing importance.
- **Public relations:** It is often difficult to communicate the various benefits of networking initiatives to the public. Intellectual capital reports can offer stakeholders (politics, public administration) valuable insights into the structures that have often been supported with public funding.

The RICARDA Methodology

Within the RICARDA project a basic model for the intellectual capital reporting of regional, technology-oriented networks was developed. It is based on existing methods for intellectual capital reporting on the level of companies and complementary research on existing instruments for the management and evaluation of networks (see diagram below)

Table: RICARDA basic model for intellectual capital reporting



Network objectives, the network's intellectual capital and the results of the network are main elements of the basic model. These three elements are closely linked together. The intellectual capital should be focused according to the network's objectives. It contributes – in its three dimensions of human, structural and relational capital – as knowledge resources to the concrete outcomes of the network. Those must be compared with the network's objectives defined beforehand.

A further assumption of the base model is the variability of network objectives in time. Relevant trends in the network's environment need to be considered. Trends in technological development, in the economy as well as political expectations or policy measures influence the network's activities. They might require an adaptation of the network and thus a change or an adjustment of its objectives.

Process

The process of intellectual capital reporting for the Kista ICT cluster was carried out by a working group of selected network members and management in cooperation with researchers from the Royal Institute of Technology (KTH).

The work was organized in a series of workshops. In the center of the first workshop was a review of the network's objectives. The second workshop focused on the issue of intellectual capital. The guiding question was what aspects of human, structural and relational capital are important resources for the attainment of the network's objectives. In addition to that, possible indicators for measuring these critical aspects were identified. Starting point was a list of "success factors" that had been compiled by research partners of the RICARDA project and possible indicators for regional, knowledge-intensive networks. This list was modified substantially in the course of discussions within the working group.

After these two workshops a phase of data gathering in the form of a members' survey took place. This phase served to gather the concrete values for the indicators on network objectives and relevant intellectual capital ("success factors").

The interpretation of gathered indicator values took place in a third workshop. In a group exercise the data regarding the status quo of success factors and network objectives was assessed regarding their relative degree of attainment.

2. Intellectual Capital Report for the Kista ICT Cluster: Results

2.1 Objectives and Success Factors

An overall objective is to develop Kista into an attractive location for companies, households and research organisations that work in global networks. Because of that the Kista area should be capable of providing arenas for knowledge flows, cultural activities, services and recreation opportunities, thereby attracting competent, skilled and knowledge-intensive persons to dwell and work in Kista.

Table: Network Objectives and their rationale

OBJECTIVES	RATIONALE
01 Overall	The Kista ICT cluster management aims at contributing to the growth of the economy of the Stockholm region. A measure for this is to maintain Kista as an infrastructure that can stimulate and promote the development of innovative ideas, and support their realisation
02 Knowledge creation	One of the objectives for the Kista Science City AB is to support both start-ups and established companies in their innovation process (both product and process) and to consult them in the commercialization phase. Concrete examples are the start-up program, the business lab, the business accelerator and growth programs. The support of the network managers is mainly concentrated to the coordination of the different activities carried out in the network member firms and marketing of the firms` services and products.
03 Promoting flows of new knowledge	The Kista Science City AB is orienting towards new knowledge by bonding the academic environment of the Royal Institute of Technology (affiliation located in Kista) with the professional environments in the firms (particularly the R&D units). Kista Science City consists of 350 firms in the ICT industry, and the Royal Institute of Technology have located their courses related to ICT (electronics, Information Technology etc.) to Kista. It is therefore natural for Kista Science City to focus especially on the ICT industry and try to make both the academic and professional environments take advantage of each others competences in order to create new knowledge.
04 Attracting highly qualified labour with relevant skills for the knowledge intensive network	Out of all the employees in Kista, there are 1100 researchers, mainly in the ICT industry. Both the firms and the Royal Insitute of Technology have establishments for their highly skilled labour force. An objective should be to tie these highly-skilled labour groups closer together through educational meetings, arrangements etc.
05 Provision of common infrastructure facilities and associated services (creation of a club)	Kista Science City AB offers a variety of services for its member firms. In addition to the offices of the network management the network has bigger rooms to its disposal for meetings involving a larger number of network member`s employees. The network management puts great efforts in getting to know key personnel in the member firms in order to maintain an unofficial atmosphere. It is the intention that employees of the network member firms should be well informed about the network management`s services and feel free to contact them in case they need these services.
06 Functioning of the network operation	In collaboration with the network firms, the Kista Science City AB has a mission to identify areas where improvements and adjustments are warranted. Especially the collaboration with the Royal Institute of Technology should be investigated to see if the needs of the network partners could be supported (consulting etc.) by the highly competent academic environment.

In the following table success factors are organised into (K) knowledge or human capital, (S) social capital, (R) relational capital.

Table: Success factors and their motivation

SUCCESS FACTORS IN THE FORM OF CAPITAL RESOURCES	SUCCESS FACTORS AS IDENTIFIED BY THE KISTA SCIENCE CITY AB
K1 Knowledge base (in terms of persons in network)	<p>The Kista Science City host a large and varying number of companies. When the Ricarda work started 780 companies were identified, comprising around 350 ICT companies and 200 SMEs. At that time the number of employees in the cluster was 29 000, of which more than one thousand were researchers.</p> <p>A particular resource is the local affiliation of KTH with 4000 students. Of these 4000 students, 2400 have an international background.</p> <p>The huge variation of nationalities of employees, firm-characteristics and positions must be regarded as an important success factor for the Kista Science City.</p>
K2 Knowledge creation and training due to network management activities	<p>Stockholm Innovation & Growth is offering a support system for technology start-ups. The support system consists of four main programs; the start-up program, the business lab, the business accelerator and growth programs. These programs are mainly targeted towards SMEs. Bigger companies e.g. Ericsson, Sun, Scania, Saab have their individual programs.</p>
K3 Individual learning	<p>Royal Institute of Technology (KTH) has a local affiliation in Kista, with more than 4000 students. Stockholm Innovation & Growth offers programs for individuals that want to develop their managerial skills (e.g. in sales management, project management, technology management etc.). These activities tend to increase both the individual human capital and the relational capital of the whole cluster.</p>
K4 Inter-organisational learning	<p>The Kista Science City and the Royal Institute of Technology are involved in the activities of the member companies and students and managers have the opportunity to meet with each other both formally through educational activities and informally (informal meeting centred around different topics, career days etc.). The interaction between the academic environment and the companies is one of the priorities for Kista Science City as it will contribute to a more innovative environment in the companies and tie potential employees and firms closer together.</p>
S1 Social capital	<p>The Kista Science City is located on a relatively small land area (2000000m²) where office space is about 1100000m². The consequence of the limited land area is that the employees are interacting during both working hours and their leisure time. Lunches, working dinners are mostly carried out in some of the local restaurants a fact that promotes social interactions among the employees in the cluster. Kista science city is also home of the largest shopping centre in Northern Europe, which contains informal meeting places like a theatre, bowling, cinemas, gyms etc. These arenas for socialization should not be underestimated.</p> <p>In addition to these informal arenas, the Kista Science City network is arranging meetings with it's partner firms, where the firms' representatives have the chance to socialize in a relaxed environment.</p>
S2	<p>Kista Science City AB has as close collaboration with Stockholm Town and the Royal Institute of Technology in Stockholm. In addition</p>

Partnerships and networks	the Kista cluster is participating in the RICARDA project.
S3 Innovation capacity and networks	The firms participating in the Kista Science City AB belong to the group of firms with the largest R&D-budgets in Sweden (Ericsson, Scania, TeliaSonera etc.). Because of the cost of researchers in Sweden and also the competences, foreign firms are attracted to locate parts of their R&D units to Sweden, including the Kista cluster (Microsoft, Intel, Nokia etc). Generally the ICT industry, which is well represented in the Kista network, is a very R&D intensive industry. With the close distance to Stockholm city and the innovation related activity taking place in various locations in and around Stockholm, one might conclude that the innovative capacity of Kista Science City AB is very high constituting an important success factor.
S4 Common infrastructure and services	The Kista cluster is located north of Stockholm, just 15 minutes by train to Stockholm centre. The distance to Arlanda airport is about 30minutes by car. Common infrastructure has a high standard and Stockholm and its surroundings has everything an international city can offer. This can be regarded as an argument for attracting new firms to the area, and also making it easier to recruit key personnel (managers, researchers etc.) to the firms located in the Kista cluster.
S5 Management and institution building	Kista Science City AB is a part of the Electrum foundation. In the board of the Electrum foundation we find the technical director of Ericsson, the mayor of Stockholm, the CEO of IBM-Nordic, the president of the Royal Institute of Technology and the CEO of LjungbergGruppen. This diverse, but very competent group of people is a guarantee that the management of the Kista Science City AB will consist of highly skilled persons. That the persons in the board of the Electrum foundation are influential persons can be regarded as a success factor, as the Kista Science City AB will always find support for their activities from the different organisations and arenas.
R1 Sound embedding into regional/national innovation system	The Royal Institute of Technology, which is one of the partners in the Kista Science City AB, is Sweden's most important institute of technology playing an important role in the Swedish and Scandinavian innovation system. The Royal Institute has a wide array of collaboration with both private firms as with important academic institutions abroad. In the Kista campus 4000 students are studying, 60% of which have an international background. The participation of the Royal Institute of Technology in the Kista Science City AB is intended to strengthen the collaboration between firms and academia in the Kista cluster. The identified success factors are: high degree of internationalization, world leading academic researchers and collaboration with leading academic institutions in the whole world.
R2 Co-operations with other networks/clusters or institutions/single firms	Through the RICARDA project, Kista Science City AB is collaborating with clusters from various European countries.

2.2 How do Objectives and Success Factors Match in the Kista Area?

In this subsection, we investigate how different success factors help to approach the achievement of the specified objectives. We will examine this for each objective.

Objective O1: The overall goal of growth

The promotion of economic growth in the Kista area and the Stockholm region relies mainly on the following factors:

- (K1) The knowledge base, embodied in networks, skills and experiences, competence and education of individuals working in the Kista area
- (K2) R&D efforts and the support system to foster startups
- (K4) The most important aspect of inter-organisation learning stems from persons switching job affiliation, when moving from employment in one Kista-firm to another.
- (S2) The collaboration between the Kista cluster management and the municipality of Stockholm
- (S4) The common infrastructure facilities and the associated services that Kista offers its firms are of prime importance, more important than any other factor.

Objective O2: Knowledge creation

Knowledge creation is fuelled by several factors, including Kista's capability to attract foreign multinationals to place subsidiaries in the area:

- (K1) The local knowledge base and absorptive capacity is vital
- (K2) Support systems for knowledge creation are assigned to stimulate technology development and entry of firms with knowledge assets
- (K4) The influence from interaction between university research and training of new engineers foster knowledge creation
- (K4) Diffusion of knowledge through immigration of foreign firms, in particular firms supplying ICT products and services
- (S3) Innovation capacity of the Kista area, based on R&D units of large multinational firms. These firms also show a greater propensity to interact with university research
- (R1) Interface between Kista firms and the national innovation system

Objective O3: Promoting knowledge flows

Knowledge flows have diverse directions. The objective is not only to promote flows that are directed towards the Kista area and the firms hosted there, it is also a matter of diffusion of knowledge from Kista to the rest of the Swedish economy. This raises issues of knowledge protection and privatisation.

- (K1) The local knowledge base and its absorptive capacity are vital
- (K2) Support systems for knowledge creation also stimulate knowledge flows
- (K4) Inter-organisational learning is a specific form of knowledge exchange
- (S1) The dense spatial cluster in Kista brings about proximity externalities, which support flows of complex and tacit-like knowledge
- (S5) Management and institution building

Objective O4: Attracting qualified labour

- (K1) The establishment of skilled labour in the cluster is an attraction factor in itself
- (K3) The possibilities of individual learning is an attraction factor
- (S1) The leisure environment in the Kista area is an attraction factor, where we observe that this is what the downtown of Stockholm offers. Thus, Kista has a strongly competing milieu to compete with.
- (S4) The communal infrastructure with service facilities is also necessary to make the Kista area attractive in comparison with the central part of Stockholm.

Objective O5: Provision of common infrastructure

- (S1) Social capital supported by informal arenas
- (S4) Common infrastructure and service facilities

Objective O6: Mechanisms for adjustments and improvements

- (S4) Common infrastructure and service facilities
- (S5) Management and institution building

2.3 Examining Objectives in detail*Objective O1: The overall goal of growth*

The promotion of economic growth in the Kista area and the Stockholm region is a particular mission for Kista Science City AB. Our study of ICT firms in Kista reveals several interesting things. First, firms located in Kista contribute to knowledge creation, reflected in patenting, but also through economic performance of firm units associated with firms located in Kista.

One measure of firm performance is the export performance. Measuring this as export intensity it is clear the ICT firm units in Kista have significantly higher export intensity than ICT firms in other ICT clusters in Sweden. This difference although existent is less pronounced between firms in Kista and the rest of Stockholm, however, the larger firms in Kista are multi-unit firms and they can use firms with peripheral locations in the Stockholm region for production and export activities. And indeed, ICT firms in the Stockholm periphery – with lower floorspace costs – have similarly larger export intensity than firms in the other ICT clusters in Sweden. This indicates that multinationals in the Kista area indirectly generate export incomes that benefit the Stockholm region as a whole.

One may also consider using the entry of new firms into the Kista cluster as a measure of its growth achievements. Our studies and interviews show that both entry and exit is high. In addition, a non-negligible share of the firms with addresses in Kista is not actively operating any business in the area. They are rather using the address as a branding element. This observation also tells us something about how the Kista concept is perceived by the business community.

Objective O2: Knowledge creation

Kista's capability to attract foreign multinationals to place subsidiaries in the area shows that Kista provides an attractive environment for the creation of new knowledge. Moreover, observations of patent applications by firms in the Kista area reveal that is a effective milieu for knowledge production and innovation. Multinational subsidiaries from other countries have higher absorptive capacity than average, and their location in the area reflects that the cluster offers knowledge to be absorbed.

Swedish ICT firms that frequently establish strategic alliances are to a large extent located in the Kista area. This is also a sign of knowledge creation, although only a fraction (44%) of the strategic alliances have R&D motives, whereas market motives are more frequent.

Finally, the mobility of knowledge-intensive labour between firms inside the Kista area has remained especially high, adding to the creation of new knowledge.

Objective O3: Promoting knowledge flows

Knowledge flows have diverse directions and sources. The attraction of labour to the Kista area and the mobility of the same labour between firms inside the Kista area can be appreciated as an indication of success in regard to promoting knowledge flows. The location of KTH's ICT education and research in Kista may indicate knowledge diffusion from industry to academia rather than the opposite.

There is also evidence of knowledge diffusion from the ICT cluster in Kista across Swedish locations during the past 10 years.

Comparing Kista and other locations with regard to the interaction of an individual firm in local innovation systems, we may conclude that Kista firms tend to behave in the same way as non-Kista firms do. This also means that a firm's interaction with universities in R&D shows no signs of being more intense in Kista than elsewhere. However, multinationals interact with universities, suppliers and customers in innovation activities more frequently and with more endurance than other firms. And Kista hosts many companies that belong to a multinational group.

Objective O4: Attracting qualified labour

The attraction of labour to the Kista area and the mobility of the same labour between firms inside the Kista area has been very successful. This feature of the area is an important motivation for firms' decision to locate in the cluster. In addition, Kista is a part of the Stockholm region, located rather close to Stockholm's CBD and to the Arlanda airport, which gives the area attractive features due to its proximity to other attractive zones in the Stockholm region. For example, commuting to and from Stockholm city functions very well.

Objective O5: Provision of common infrastructure

The location of Kista is the outcome of a combination of long-term spatial planning and some fortunate circumstances. The idea to locate high-tech industries in the present Kista area was suggested already around 1970. The choice of location has proven to be very successful. During the development of the built environment during the 1980s and 1990s, developers and property managers manage to bring about a desirable composition without

any overall planning, while using intense communication between industry and policy as an alternative method.

Today a lot of the effort is spent on managing what is already there. In this context Kista Science City AB may be said to have satisfied many of its goals.

Objective O6: Mechanisms for adjustments and improvements

Procedures and mechanisms to manage the problems that arise when certain firms expand and others contract are perhaps the most important issues for managers of urban structure in the contemporary economy. Firms in the Kista area report that the pertinent approaches applied in the case of Kista are working well. In this regard, one may contemplate to use Kista as an exemplary case, providing guidelines for other cluster areas.

2.4 Examining Success Factors in Knowledge Capital Formation

K1: Knowledge base and its development

In view of the Kista cluster, the most successful component in developing the knowledge base in the form of human capital has been the establishment of KTH's section. It is difficult to assess the benefits and costs of this decision. The section is spatially separated from the rest of KTH, and this reduces interaction. On the other hand, the opportunities have increased for mutual feedback of information between KTH-Kista and the firms in Kista. It seems clear that this latter process may be further improved.

K2: Knowledge creation in the Kista cluster

The likelihood of finding an innovative firm in the Kista area is on average greater than in the other locations in Sweden. This higher propensity to be innovative also applies to the Stockholm region as a whole. In this context an innovative firm is identified by having made innovation efforts during the last two years, and/or having introduced novel products during the same time period.

Of those ICT-firms that can be classified as innovative, 52 percent collaborate in their innovation activities with other firm units in the company group to which they belong. Around 50 percent cooperate in vertical innovation systems, in which they work together with customer firms and/or input suppliers (including suppliers of knowledge inputs). We have collected information about 82 innovative ICT-firms in Kista, and we have examined 29 ICT-firms in Kista in more detail.

When comparing innovative ICT-firms in Kista and the rest of Sweden, they do not differ in their frequency of innovation interaction with universities and laboratories. In general, around 30 percent of the innovative firms participate in such collaborative R&D work.

The interaction of Kista firms in innovation systems can be classified into (i) local collaboration in Kista, (ii) collaboration outside Kista but in Sweden, and (iii) global collaboration outside Sweden. For collaborating firms in our study, the frequency of these three forms of collaboration was as follows:

- Local collaboration = 34 percent
- Domestic collaboration = 79 percent
- Global collaboration = 52 percent

Comparing these observations with information from other studies, we consider the figure 34 percent local collaboration to be quite high. It implies that a lot of firms in Kista combine local innovation collaboration with collaboration outside Kista with other firms in their own company group. Primarily, this favourable result should not be attributed to the management of Kista Science City and other decision makers of the “Kista cluster club”. It rather reflects the following two things:

- Kista is a dense cluster located close to the centre of the Stockholm metropolitan region
- Kista is located at a short distance from Arlanda airport, providing good international accessibility

K4, S1 and S3: Inter-organisational learning, social capital and innovation networks

A lot of the favourable development of Kista can be explained by firm attributes, rather than spatial attributes of Kista. Thus, the achievements of Kista are primarily explained by its capacity to attract firms with attributes that make them innovative and profitable.

To substantiate the above conclusion we should consult the following information:

- A large share (almost 80%) of innovative ICT-firms in Kista belong to a company group (multinational company)
- Kista ICT-firms have a larger than average knowledge intensity (share of employees with university education)
- Kista ICT-firms have a stronger orientation towards software and service production than other ICT-firms in Sweden.

Knowledge-intensive ICT-firms have larger export intensity than other ICT-firms. This firm attribute explains export intensity in a significant way. Now, Kista firms are more knowledge intensive than average. When this is taken into account, the additional Kista effect as regards export intensity is not as strong as one might expect.

Firms belonging to a company group can benefit more from inter-firm learning than other firms. Thus, Kista firm units benefit from both local learning inside the cluster and global learning through collaboration in the network of the company group.

The composition of ICT-firms in Kista has the following estimated profile:

- Telecommunication = 23 percent (59 percent for Sweden)
- Software = 16 percent (1 percent for Sweden)
- Content = 26 percent (8 percent for Sweden)
- Other services = 16 percent (16 percent for Sweden)
- R&D = 11 percent (7 percent for Sweden)

This diverse composition of firms may be considered as a special asset for inter-organisational learning. From the information collected in our study, it is likely that much more could be gained from even more interactive learning.

S3, S4 and S5: Innovation networks, infrastructure services and management

The information from small innovative firms in the Kista cluster provides a picture that emphasises the importance of local networking and local collaboration. For larger firms the picture is different. Larger firms seem to appreciate that Kista functions as an international hub for global interaction in the ICT sector.

The location in space and the design of the infrastructure of the Kista area make the cluster an attractive meeting place for international interaction in the field of ICT industries. For the type of firms that are located in Kista, this feature of being a arena for global interaction is considered at least as important as its facilities for local interaction inside the cluster area.

In this context the programs of the Kista cluster are setting the ground:

- Program to support technology startups, providing a training program for potential entrepreneurs with an idea
- Program contents include: preparation for international sales, establishment of a business plan
- There is a business coach program which includes (i) securing optimal financing, (ii) technology coaching, (iii) office and infrastructure design

All these efforts to make the Kista cluster a place for novel innovative firms is primarily directed towards small firms. However, these also include “spinouts” and “spinoffs” from larger firms

3. Appendix

The highly dynamic nature of the Kista ICT cluster should by now be rather evident. Several different sources had to be utilized to reach the conclusions summarized above that transcend the limits of the RICARDA project. The Swedish ICT industry and the Kista ICT cluster in particular have been the subject of many research projects, several of which were carried out by members of the RICARDA research team. This past experience was important in evaluating the data gathered for the ICR report.

The Kista Innovation Survey (KIS) that was tailored and launched specifically for the RICARDA project was based on the fourth Community Innovation Survey (CIS-4) that addressed all Swedish firms irrespective of their industry or location. KIS produced 29 usable answers while a total of 69 matching firms were recognized in CIS-4. Li (2007) used a matching estimation process in an effort to explore the differences between Kista firms and firms in the rest of Sweden in developing interactions within innovation systems. However the results are not conclusive. Using only the KIS answers it appears that innovative ICT firms in Kista collaborate significantly more in intra-enterprise horizontal and vertical level, in accordance with relevant literature on the effects of clustering and proximity. On the other hand, when considering just the CIS-4 results the differences between the Kista cluster and the rest of Sweden, as far as interactions within innovation systems are concerned, are insignificant. It is very likely that firms using mail addresses in Kista just for branding without having local activities would answer CIS-4 but not KIS thus distorting the research results making any conclusion rather problematic.

Granås (2007) in an attempt to ascertain the strategic alliances of the Swedish ICT industry gathered information from the 2003-2005 press releases of seven major Swedish ICT firms, four of which have a direct relationship to Kista through location, representing 90% of the identified alliances. In this research a strategic alliance is defined as a formal collaborative relationship between firms characterized by the long-term commitment of the partners to reach a common strategic goal. Key requisites are long term commitment, strategic collaboration, and bilaterism. The results are in line with relevant literature and it appears that the number of strategic alliances is directly proportional to the size of the firm. Also large firms are more likely to form alliances with firms from outside the Nordic countries. This is in accordance with the above analysis where it is made clear that it is mostly small and medium sized firms that stand to gain from agglomerating in Kista, since national borders are less important for larger firms when forming strategic alliances.

The third source of data used was the very rich database of Statistics Sweden that includes detailed information on the firm level. Each firm is tagged with a unique identification number and the information available includes the location of the firms' offices and production plants per municipality. It was thus possible to isolate the ICT firms located in the area of Kista. This is the procedure used in Baltzopoulos (2007) and several effects of the Kista cluster were examined and included in the present report.

Observables for identifying network objectives and intellectual capital indicators in static and temporal perspectives

CRITERIA	ASSESSMENT VARIABLES	TEMPORAL ASPECTS (Trends)
Information about firms in Kista	<ul style="list-style-type: none"> • Number of employees • Turnover per employee • Share of employment with a university degree • Gross investment • Innovation expenditures • Recurrence and persistence of R&D engagement • New production routines • New products and product renewal • Division of firms in the area that are member and not in the cluster organisation • Share of firms with an address but still a limited presence in the cluster area 	<p>Monitoring firm characteristics to make certain that already achieved success levels do not decline, especially with regard to variables referring to intellectual capital and to innovation intensity</p> <p>Development of non-member share and reasons for lack of membership in the cluster</p>
Innovation networks for collaboration	<ul style="list-style-type: none"> • Networks for firms' interaction with universities and laboratories, specified for networks as capital and for how intense the use of networks are • Networks for interaction between firms – vertically and horizontally • Global networks with nodes in the Kista cluster • Contact pattern between firms in the cluster 	<p>A vital temporal aspect is to monitor how external and internal collaboration links develop. When external links are getting relatively stronger, the cluster location becomes less obvious</p>

Support system for new firms in the cluster area	<ul style="list-style-type: none"> • Support programs for start-ups and small firms • Support systems for learning • Resources consumed in network and cluster management • Facilities that are public vis-à-vis cluster members 	Monitoring demand for support activities and assessing the learning ambitions and capacity of new (entering) firms. Are the entering firms of the right kind? Do they add to the future intellectual capital of the cluster area?
Support activities for the cluster area	<ul style="list-style-type: none"> • Newsletter production and dissemination • Other mediated dissemination, communication portal • Video presentation material 	
Markets for the cluster output	<ul style="list-style-type: none"> • Sales development • Export and import performance • Distribution of destination markets (local, national and nodes in the global economy) 	Do firms in the cluster import more or less of product and services that embody new knowledge. Global knowledge inflows had remained a special characteristic of the Kista cluster and should be fostered.
Supply of producer services in the cluster area	<ul style="list-style-type: none"> • Categories of producer service firms in the area • Division of firms that service the area and an external market, respectively 	

REFERENCE TO STUDIES OF KISTA AND STOCKHOLM'S ICT SECTOR:

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SIXTH FRAMEWORK PROGRAMME

