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**Increasing social capital and social cohesion on science parks:
Beyond the ordinary meeting place**

Roundtable 4

STPs at different economic and social stages

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Increasing social capital and social cohesion on science parks: Beyond the ordinary meeting place

Executive summary
Recent studies confirming social capital benefits through strategic and proactive commitment to building effective relationships within the science park eco-system (Martìnez-Cañas and Ruiz-Paolmino 2010; Hansson and Vestergaard 2005; Heshmati 2007) serve as a clarion call for Scienceand Technology Park managers, staff, and stakeholders to asses traditional park services and organized events to determine their effectiveness and seek out good practices that serve to improve their park's capacity to innovate through better social cohesion.

This paper offers a review of social capital literature and provides an overview of social capital development activities used in thirteen science parks throughout Scandinavia and the Baltic Region. The study, using social capital dimensions proposed by the World Bank, serves as a preliminaryexploration to determine how STPs understand social capital, the degree to which they strategically translate activities and events into social capital, and possible steps needed to begin evaluating the effectiveness of these strategies.

Introduction
Science and Technology Parks (STPs) are no longer the experiments that they once were. Managers, stakeholders and park clients have learned a great deal about each other and what they need to build successful innovation environments. It is generally accepted that the formula of a successful science park is not only a collection of spaces and facilities. It is above all a collection of people that cooperate in gaining social capital and thereby create economic growth. 'Meeting places' has always been a watchword in the industry, but opinions vary as to what these places are, how they are defined, used, and promoted and how well they serve to meet or exceed the park's objectives. Moreover, more recent discussions of knowledge ecosystems (Townsend, Soojung-Kim Pang & Weddle 2009;Edvinsson, L 2008) remind us that the social capital of a park extends well-beyond the park's physical boundaries and thereby challenging social cohesion strategies.

In this paper, we review literature on social capital and social cohesion as they relate to the science park environment. Then, relying on data gathered from a survey of Scandinavian and Baltic Science Parks, we discuss the kinds of social capital strategies that are currently in use to advance individual park objectives.

What is social capital
Social capital is a term that is used not only among sociologists but throughout the social sciences. One of the first mentions of "social capital" is as early as 1916, where L.J.Hanifan (1916:131) wrote an article on local support for rural schools:

> "If he may come in contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement on living conditions in the whole community. The community as a whole will benefit by the cooperation of all its parts, while the individual will find in his associations the advantages of the help, the sympathy, and the fellowship of his neighbors."

In the literature, definitions of social capital tend to reflect their disciplinary contexts. Some relate to social capital within organizations; others are about relationships among organizations and their external actors. What they all hold in common is the basic premise that two heads are often better than one and that through proactive cooperation across social structures, organisations and communities can leverage the productivity of their resources. Pierre Bourdieu, having already conceived in the 1970s his notion of cultural capital where he considered the non-financial benefits that accrue through intellectual and educational interactions in society, developed three other concepts of capital: social, economic, and symbolic. He refined Hanifan's definition of social capital suggesting that this form of capital represented "The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (Bourdieu 1986:248). The durability of the social network was, for Bourdieu, an important component of the value of these relationships. References to capital did not necessarily indicate that cultural, social or symbolic forms of capital were necessarily measureable in direct economic terms, but there is no shortage of individuals who are attempting to find ways to measure them (Bankston& Zhou 2002). Certainly using the term "capital" along with the term "social" indicates, even metaphorically, that their ought to be measurable value. But it is this very discussion that challenges STP managers when they seek to measure the impact and subsequent value of their social capital development.

Adler & Kwon (2002) have sought to mediate some of the conflict and confusion surrounding the "elasticity" (Lappe& Du Bois, 1997: 11) of social capital through a thorough examination of definitions. See Table 1.

Table 1: Definitions of Social Capital (Adler & Kwon 2002: 20)

External versus Internal	Authors	Definitions of Social Capital
	Baker	'a resource that actors derive from specific social structures and then

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		use to pursue their interests; it is created by changes in the relationship among actors'; (Baker 1990, p. 619).
	Belliveau, O'Reilly, Wade	'an individual's personal network and elite institutional affiliations' (Belliveau et al. 1996, p. 1572).
	Bourdieu	'the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition' (Bourdieu 1986, p. 248). 'made up of social obligations ('connections'), which is convertible, in certain conditions, into economic capital and may be institutionalized in the form of a title of nobility' (Bourdieu 1986, p. 243).
	Bourdieu Wacquant	'the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition' (Bourdieu and Wacquant 1992, p. 119).
	Boxman, De Graai. Flap	'the number of people who can be expected to provide support and the resources those people have at their disposal' (Boxman et al. 1991, p. 52).
	Burt	'friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital' (Burt 1992, p. 9). 'the brokerage opportunities in a network' (Burt 1997, p. 355).
	Knoke	'the process by which social actors create and mobilize their network connections within and between organizations to gain access to other social actors' resources' (Knoke 1999, p. 18).
	Portes	'the ability of actors to secure benefits by virtue of membership in social networks or other social structures' (Portes 1998, p. 6).
Internal/ Bonding/ Linking	Brehm Rahn	'the web of cooperative relationships between citizens that facilitate resolution of collective action problems' (Brehm and Rahn 1997, p. 999).
	Coleman	'Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure' (Coleman 1990, p. 302).
	Fukuyama	'the ability of people to work together for common purposes in groups and organizations' (Fukuyama 1995, p. 10). 'Social capital can be defined simply as the existence of a certain set of informal values or norms shared among members of a group that permit cooperation among them' (Fukuyama 1997).
	Inglehart	'a culture of trust and tolerance, in which extensive networks of voluntary associations emerge' (Inglehart 1997, p. 188).
	Portes Sensenbrenner	'those expectations for action within a collectivity that affect the economic goals and goal' seeking behavior of its members, even if these expectations are not oriented toward the economic sphere' (Portes and Sensenbrenner 1993, p. 1323).
	Putnam	'features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit'

		(Putnam 1995, p. 67).
	Thomas	'those voluntary means and processes developed within civil society which promote development for the collective whole' (Thomas 1996, p. 11).
Both types	Loury	'naturally occurring social relationships among persons which promote or assist the acquisition of skills and traits valued in the marketplace. . . an asset which may be as significant as financial bequests in accounting for the maintenance of inequality in our society' (Loury 1992, p. 100).
	Nahapiet Ghoshal	'the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social capital thus comprises both the network and the assets that may be mobilized through that network' (Nahapiet and Ghoshal 1998, p. 243).
	Pennar	'the web of social relationships that influences individual behavior and thereby affects economic growth' (Pennar 1997, p. 154).
	Schiff	'the set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function' (Schiff 1992, p. 160)
	Woolcock	'the information, trust, and norms of reciprocity inhering in one's social networks' (Woolcock 1998, p. 153).

Like Bourdieu, Adler and Kwon also take the notion of durability one step further by stating that the core "intuitions" inherent to social capital development between relationships are based on goodwill and dependent upon sympathy, trust and forgiveness among and between friends and acquaintances (Adler & Kwon 2002:18). This may be easy to understand—but difficult in practice. They insist that attempts to measure social capital in traditionally economic terms is to miss the metaphorical emphasis of "capital". Taking into consideration all of the definitions listed in Table 1, they define social capital as "the goodwill availableto individuals or groups. Its source lies in the structure and content of the actor'ssocial relations. Its effects flow from the information, influence, and solidarity it makes available to the actor" (Adler & Kwon 2002:23).

According to CPN, Civic Practices Network (2012), social capital tends to cumulate when it is used, and be depleted when not, thus creating the possibility of both virtuous and vicious cycles that manifest themselves in highly civic and uncivic communities (Hastings & Matthews 2011).[1] What this means essentially is that just as with any networking phenomenon, one must care for and nurture one's relationships—building goodwill. Without this nurturing, social capital is not cohesive, simply by default.

Adler and Kwon (2002) describe several benefits of social capital saying that "social norms and beliefs, associated with a high degree of closure of the social network, encourage compliance with local rules and customs and reduce the need for formal controls" (p. 29). These norms and beliefs are what bring individuals together. They can also serve as elements of conflict between groups, peoples, or organizations that do not share the same norms or rules and customs. For this reason, notions of social cohesion have been interesting not only in business development and corporate contexts but in discussions regarding cultural diversity, integration, mobility, criminality, terrorism, and EU harmonization efforts.

The World Bank (2012) states that "social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions.Increasing evidence shows that

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[1]Originally used to describe favourable and negative economic cycles, Hastings and Matthews describe virtuous cycles, for example, as the positive effect over time on personal efficacy of individuals in socio-economic settings who have had "successful encounters with public agencies" (Hastings & Matthews 2011: 7).

social cohesion is critical for societies to prosper economically and for development to be sustainable. Social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together".

Strategies that consider the implications of social capital should ideally encompass the breadth of positive and negative aspects of social cohesion as well as an understanding of the interplay and intensities between what is known as horizontal and vertical networks or associations (Breton &Weintrobe 1982). One's vertical network includes one's family, friends, colleagues, and what we might call first-degree connections. One's horizontal network includes second-degree and beyond, including strangers who may or may not join the vertical network, but who may be indirectly connected regardless.The design and creation of online networks such as LinkedIn and Facebook reflect the theories first described by Breton and Weintrobe.

The World Bank has identified five dimensions of Social Capital which we believe are useful starting points for successful implementation and even measurement of social capital development strategies, regardless of social, political or economic contexts:

- Groups and Networks
- Trust and Solidarity
- Collective Action and Cooperation
- Social Cohesion and Inclusion
- Information and Communication

These five dimensions have served as the basis for our survey questions and as the framework for discussion of the results. We will discuss them in greater detail in the results section beginning on page six.

Why isSocial Capital of interest for business performance and science parks?
Westerlund&Svahn (2008) performed a study on how social capital is a basis for relationship value. For small- and medium-sized enterprises (SMEs) entrepreneurial networks and knowledge often are the most critical assets.Westerlund&Svahn divided the social capital into cognitive, structural and relational dimensions. They found that the importance of specific relationships in a value-creating network are not constant, but vary according to the type of relationship. The high relationship value relates mainly to individuals. The high perceived value of a relationship with an individual can be more important to software companies than the overall image of a partner firm. Science park managers who recognize the variability between different kinds of relationships inherent to building social capital in their park and innovation eco-systems, will likely work strategically to take into account the structural and relational dimensions in particular.

Partanen et.al. (2008) found increasing evidence of the positive role social capital plays in accessing resources and capabilities from and with other actors, and in establishing and maintaining business relationships. Network mobilization capability is a key condition for small firms to be innovative and grow. At the same time little is known about how an organization's social capital and its utilization evolve over time and what kind of implications this has. These are aspects of social capital that STPs can address, record, and even measure. STPs that have developed strong relationships with neighboring university departments and laboratories, for instance, have been able to leverage opportunities to share human resources, equipment, and information that benefits research and development in both the university and in companies on the park as well as the chances for spin-off activity.

Wright et al (2008) studied 349 SMEs frånZhongguancun Science Park in China. They found that it was very important for a science park to attract the "right" kind of returnee entrepreneur for the particular kind of STP as this can provide human and social capital that link to other markets within the region. "Recognition of this challenge implies the broadening of our perspective in science parks beyond their mere provision of space and facilities" (Wright et al 2008:151).For STP managers who are working on parks that are less oriented towards social capital development and more towards the selling of space and services, this broadened perspective described by Wright et al (2008) has significant implications for increasing not only the likelihood that sales will improve, but that the quality of the STP will also improve.

Nahapiet&Ghoshal (1998) have discussed organizational advantages as accruing from the particular capabilities that organizations have for creating and sharing knowledge. They follow the arguments that social capital facilitates the creation of new intellectual capital; that organizations, as institutional settings, are conducive to the development of high levels of social capital; and that they because of their more dense social capital that firms, within certain limits, have an advantage over markets in creating and sharing intellectual capital. Expanding on their theories, Martinez-Cañas& Ruiz-Palomino (2010) performed an empirical analysis of business-university relationships to find out more about social capital generation inside science parks. They focused on technological companies located inside Spanish Science Parks and found that firms' relations with universities generated social capital and once created had a significantly positive effect on firm performance. Indicators measured included knowledge acquisition and reputation. The researchers were surprised by their results that social capital did not seem to lead to the creation of new products, but we would suggest that future assessments by STPs should continue to look at knowledge acquistion, firm reputation, and new product development as possible outcomes from pro-actively generated social capital.

Can social capital be negative?
Although we adhere to the belief that strategically developed social cohesion leads to increases in positive social capital, Portes (1998) points out four negative consequences of social capital which serve as useful caveats for STP managers who are developing effective network schemes:
- Exclusion of outsiders
- Excess claims on group members
- Restrictions on individual freedom
- Downward leveling norms

The positive and negative effects of social capital are very much dependent on their contexts. Besides the plethora of academic articles written since Adler and Kwon in multiple disciplines covering aspects of social capital, public sector documents reflect ever-increasing interest in bringing discussions about social capital to to forefront of policy-making. In academic, business, and government sectors, people are interested in the meaningfulness of relationships, for economic interests as well as for something deeper and much less measureable.The expansive growth of online social networks over the last decade has led to increased communications across and between companies and to greater complexity of relationships. What has not changed, however, is what appear to be the very predictable ways that networks of any kind behave (Barabási 2011). This realization by systems specialists led to the notion that such things as strong, weak and absent ties exist within networks (Grannovetter 1973).

Grannovetter and others since his formalisation of network ties (Bourdieu 1985; Coleman 1988; Burt 1992; Putnam 2000), have presented ways of understanding, categorizing and measuring the ties in terms of the length of time people have known each other, the number of times they have met, the context of emotion and trust between them, how much and what kind of information is shared between them, what level of reciprocity and even power exists between them, what is done with their shared information, and how information is spread. Allof these factors work together to creating stronger, weaker, or additional ties and to build up or even to break down social capital.

Survey of Social Capital Investment in Scandinavian and Baltic Science Parks
Using the five World Bank dimensions of social capital to frame this study, and assuming that positive social capital is created from cohesive relationships, we designed a set of exploratory questions for STP managers regarding the interactive events on their parks that were designed to develop social capital. In December 2011, we sent surveys to 33 STPs in Sweden, Finland, Denmark, Lithuania, Latvia, and Estonia as well as to Norway and Iceland. With a 39% response (13 STPs) and given the homogeneity of STP practice in these countries, we feel that the 13 parks, representing Sweden, Denmark, Finland, Estonia, and Lithuania, more than adequately represent the Baltic region STPs.

Survey Design
The first part of the survey was used to gain background demographical data which included the name of the person submitting, the name of the STP, the date of founding(s), number of companies, institutions and persons working on the STP, and business areas represented by those companies and institutions. (See Appendix)

The second part of the survey asked six questions based on the understanding that the kinds of activities and events generated in STPs, or in associations with STPs, are always potential sites for social capital development. Our intention was to respect the time of those surveyed whilst still gaining some initial ideas of how the parks were creating, prioritising and even describing these activities. We knew that the concept of "social capital" would likely be interpreted in different ways also, and that this interpretation would likely influence the answers. Moreover, those respondents who view activities as "marketing and/or networking" might not necessarily have considered more strategic aspects of social capital development, but in the course of answering the questions, might have begun to do so. We did not ask about their knowledge of social capital theory, nor of their use of the term. Hence, the survey itself, by default, may have affected outcomes slightly (Krosnick and Presser 2009).

Results:
The demographical data gathered from each of the thirteen science parks demonstrates a powerful potential far beyond the social capital described in this paper. Together, these parks represent nearly 45,000 employees and 1933 companies. The companies on these STPs, not including support services such as day care, accounting and legal, restaurants, financial institutions, and marketing represent a wide breadth of industries includingcleantech and renewable energy, IT, medical devices, nanotechnology, therapeutics, automotive safety, aeronautics, visual processing and simulation, mobile broadband, robotics, rfid, healthcare, electronics, mechatronics, environmental and life sciences, and geodata.

> *"The events are organised in order to make companies meet each other in an informal way, to know each other, share their views. It leads to a higher level of synergy in the park."STP1*

The five World Bank dimensions of social capital provide a starting point for our investigation of social capital development on STPs in Scandinavia and the Baltic States. Each dimension listed below is followed by a statedassumption that reflects basic STP principals and practice. Following each dimension heading we describe the survey questions that we feel were relevant to the dimension. We offer some commentary based on the social capital literature, results from the survey data, and some recommendations relevant to practice or further consideration, investigation or research.

Groups and networks:
We know that STPs are by definition a network of companies and support groups whose interrelations should ideally improve opportunities for knowledge exchange, innovation, and forms of wealth generation—financial and social—within a community.

Survey Questions 1 and 2 queried the kinds of social capital activities held in the science park?

Here, respondents were given 14 kinds of activities from which to choose. They could choose as many as they liked and could also offer other activities in a comment box. Because of this approach, we are able to gain a quick overview of what kinds of activities are prioritised by the majority of STPs surveyed as well as which ones are used more than others. A deeper review of each individual's response provided us with a sense of consensus among and between the 13 respondents, but this information cannot be directly discerned from the aggregate response.

> *"We offer our companies free coffee and sandwiches every day of the week to promote networking." STP 9*

For example, eight of the parks conduct breakfast seminars; nine of the parks conduct lunch seminars, and eleven of the thirteenSTPs host after-hours events. Without looking at the individual responses, we cannot determine the overlaps. What we can see clearly is that the majority (11) of the parks host conferences of some kind, either half-day or full-day on an irregular basis, and three parks host regularly scheduled multi-day conferences.

In the second question, we asked whether events were regularly or irregularly scheduled, whether they were arranged by the STP or by others, and to whom the events were directed. When we look at the frequency of these events, we learn that only four of thirteenSTPshost any of these STP-generated events regularly. One STP respondent specifically states that they choose to host all events irregularly. Two others also emphasised the irregular, adhoc, nature of events planning

> *"Our gathering place for breakfast every day—where a lot of the companies get to know each other and exchange competences."* STP9

suggestion to us that events are often tailored to need, rather than simply by habit. Whether this is a strategic decision or financially motivated, or both, we do not know yet. Across all of the activities, except for some seminars and service organization meetings like Rotary, nearly 75% of all activities are coordinated by the STP. Two of the STPs, however, commented that it was important for other organizations to arrange events. From a social capital development perspective, the engagement of other groups in arranging meeting opportunities is probably an important aspect of expanding the network of social ties and in building trust between STP management, STP companies and other local and regional organizations.

Trust and solidarity

We know that there is solidarity inherent to the STP vision, but the degree to which solidarity and trust are manifest in individual STP practice, we do not know.

"Trust in leaders is integrally related to the *capacity to predict and affect their behavior*. Leaders, for their part, have little motivation to be responsive or even trustworthy toward those to whom they have no direct or indirect connection" (Grannovetter 1973: 1374). When we talk today about social cohesiveness, we are talking about ways to inhibit the kind of fragmentation within and between networks that Grannovetter says will decrease the connections between leaders and followers and consequently "inhibit trust" (p. 1374).

Have you ever experienced an uncomfortable situation with someone and then avoided him or her for weeks, months, or even years? Avoidance is a natural response to potential or real conflict. It's not the role, directly, of STPs to resolve conflicts between individuals or companies, but STPs can inhibit the kind of fragmentation that occurs within networks due to conflicts by providing ample opportunities to reduce avoidance as well, of course, to increase spontaneous meetings where people can talk with each other that lead to new networks and subsequent growth in social capital.

Question 3 asked respondents specifically about optimum meeting places for interaction on the park.

Among the physical meeting places named in the survey under question three, restaurants and kiosks, not surprisingly, were considered the most important places in an STP for meeting one another, planned or unplanned. Half of the STPs felt that open office areas generated meetings. These parks, however, included open incubation space as well which is conducive to certain forms of start-up activity but not always ideal for building trust among larger companies. On the other hand, building construction that communicates transparency, through the use of larger corridors and open glassed areas can also encourage people to talk to one another, even within companies. Eleven of thirteen parks included a wellness center as an important location for physical meetings as well. Outdoor space was also considered a viable option by most of the STPs for meeting people, even if the meeting is only momentary or serendipitous. We did not ask about meeting places outside of the park, but no one offered suggestions either. Is it possible that the way of meeting in parks is as efficient as it needs to be, or has the practice become what Bourdieu would call 'habitus' (Bourdieu 1977)?

We know that there are different kinds of networks. Some are more open; others closed. The role of an STP is to consider the variety of networks within and without the park and to consider the intrinsic and extrinsic value of those networks to each other and to the park and the park companies. There are times when an STP and its companies can benefit from the innovation and creativity that is often driven by spontaneous meetings. There are also times when certain companies or individuals within a specific industry or niche might benefit from talking to each other in more discrete ways as a means to increase the trust between them and even eventual

> *"We d[...]* *and se[...]* *compa[...]*

> *"Information we get from a company is a secret if the company does not tell us otherwise. We don't share "our" mailing lists with others. We do not offer study visits at a company if we can't see a win-win potential; we try to involve the right person from a company to our acitivities/discussions, not aperson from a too high or a too low level."* STP12

cooperation.

Question 5 asks STP management what they do to build trust and confidence on their parks; however, we did not ask how they build trust with their affiliates and partners. Social capital development on STPs requires a strategy that considers both trust building across multiple networks.

Collective Action and Cooperation

Collective action in sociological and economic contexts refers to ways in which effective collaboration of two or more people serve the public good. The leveraging of resources is a form of collective action. We know that most parks exercise forms of collective action, but we do not always know how strong the cooperation is between people, partners and alliances in individual parks and how these cooperations are developed or measured for success.

The surveys reveal a continued focus by STPs on internal collective activities. STP 7 says "We try to listen to our companies and try to arrange meetings that give value." Most STP managers would agree that listening is important for many reasons. Not only does it enable the STP to better deliver that which a company needs, but it also helps to engender trust and cooperation. That said, the ability to arrange appropriate meetings for park companies relies on the social capital that is established and built and maintained outside the park. The world of the partners and alliances is a parallel universe of networks that need as much if not more social capital work than the companies themselves.

> *Probably the most important thing is quick, efficient, smart communiaction and client relationship. Companies must really feel that being there & getting the services they get serves their interests better than anywhere else (at least in the region) - that they will be missing things when they will not be there anymore. It is the personal face-to-face meetings.* STP4

STP 4 expresses this in another way saying that trust is created: "By being a reliable partner who is known to provide value to the companies and to the larger society." This "value to the larger society" is an area we think deserves further exploration among STPs. For at least thirty years the assumption has been that STPs provide value to the "larger society". We agree, but *how* we talk about this value, measure it, and communicate it has long proven challenging. In the context of social capital, it is also possible to turn the concept of "larger society" on its head and look at it from other perspectives. What is the "larger society"? How does the larger society contribute to the social capital of the STP? How does the STP build trust with the larger society? How does the interaction with the larger society engender cooperation? Who is in? Who is out? What is open? What is closed? Who do we ask to find out? Who is 'we'?

Social Cohesion and Inclusion

STPs are defined as entities that build social cohesion as a means to meet their objectives of integrating and leveraging the strengths and resources across academia, industry, and government. We know, therefore, that most STP managers would agree that inclusion was essential in building the trust necessary to have positive social capital, but we do not know how STPs seek to increase inclusion and decrease exclusion.

In our research we saw that many of the events arranged within the STP were open not only for park companies but for others in the community. Nine of the thirteen parks responding host start-up events, and five of those nine have chosen to open their events to the wider community. Four of the STPs hold regular sporting events for park companies only, while one of the STPs hosts a sporting event that is open to the larger community. Eightof the STPs also host trade association meetings, although only one of these parks hosts the meetings regularly.Two STPs host family events and these events are directed towards park companies only. Future research on STP social capital strategies and measurement should also take into consideration indicators of gender. It would be interesting and valuable to know how many men and women participate in events, how much interaction takes place between men and women, and how greater levels of interaction between genders influences knowledge ecosystem outcomes. Successful reflexive practices by STP management should also include an exploration of how gender influences the management and creation of social capital strategies.

All of the World Bank social capital dimensions include some aspect of 'bringing together' individuals. Network, solidarity, collective, inclusions, cohesion, are all words that emphasise this. It is likely that the sport, family and even cultural events are directed towards the park companies principally as a means to strengthen the park community. Strengthening community is a necessary component of creating and maintaining social cohesion. The degrees to which STPs balance community building in the park and cross-community building between the park and the "larger society" will determine to a great extend the efficacy of social capital development.

Information and communication
We know that social capital does not happen without information dissemination, sharing, and active communication, but defining and optimizing information and communication strategies that promote positive social capital remain less clear.

Grannovetter (1973) emphasises the importance of ties when it comes to the spreading of information, particularly when it comes to the introduction of a new idea or organization. Citing Katz and Lazarsfelt 1955 and Rogers 1962, he said that "people rarely act on mass-media information unless it is also transmitted through personal ties; otherwise one has no particular reason to think that an advertised product or organization should be taken seriously" (p. 1374).

The chart below (Figure 1) reflects both the frequency and distribution of information from STP management.For example, newsletters remain one of the principal forms of information dissemination with three of the parks communicating quarterly, five monthly, two fortnightly, and two weekly. Not restricting respondents to the distribution description, we can determine that although half of the parks send newsletters specifically to company managers, three quarters of the parks send newsletters in either digital or print form to a wider community. The question was designed principally to understand, loosely, what the respondents viewed as their audiences in the context of communication and hence the boundaries of their social capital networks.

Email is the principal form of communication to company managers on 11 of the 13 STPs responding. Of these 11, all of them communicate monthly or more often, most of the time with managers of park companies.

As with all of the questions in the survey, our intent has been to stimulate ways of thinking about interactions with companies, partners, stakeholders, and even internal staff as much as to gain some indications of how STP management is prioritising social capital development. Communication is essential in building trust, not only with STP companies, but with individuals and organisationsoutwith the park as well. But communication means many things. The content of newsletters, emails, twitters, and blogs can serve to build credibility and trust, or to break it down.

Nine of the STPs responding reported that they conducted walk-arounds, meeting with park companies face-to-face regularly. Whilst such a practice can be time intensive, we agree that it is a valuable practice allowing for the highest degree of interaction and trust-building where STP management is demonstrating interest in its clients, hearing client needs, and seeing companies in action first hand.The size of a park will certainly determine the kinds of resources and time needed to establish regular and personal contacts with the park companies. How successful an STP can be in achieving face-to-face meetings will also therefore be determined by the social capital strategy that the park creates. Problems of "scale-up" are inherent to good innovation!

> *"Everything we do is to some extent a part of working with the social capital."* STP12

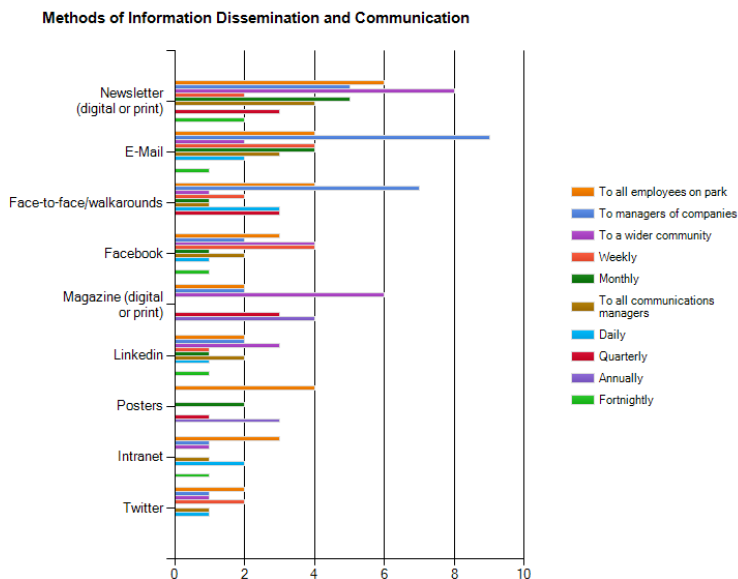**Methods of Information Dissemination and Communication**

Figure 1.

Seven of the parks are using Facebook to reach not only the park but wider audiences through public access, and three of the parks are Twittering—two of them weekly and one daily. Social networks offer new opportunities to strategize social capital development. They can also be used to measure communication and information dissemination.

Facebooking, blogging, and twittering, once established, can provide excellent channels of interactive communication. In many ways, online social networks are also fragmented and it takes a broad communication strategy to capture individual communication preferences. Email remains an excellent tool for broadcast dissemination of information to large groups, but answers to broadcast emails are seldom considered essential, or desirable. Blogging has become the communication tool of choice by media stars, politicians, university and corporate presidents, and yes, even STP management.
Facebook and Linked In, while not the tool of choice by everyone, still provides a simple and efficient way for information to spread to broader audiences beyond the park and it also serves as a feedback mechanism. Marketing and communications specialists recognize that these do not reach all audiences, but the online social networks are expanding rapidly, and social media allows the flow of multi-directional communication in and out and through the science park community.

Our last question asked what kinds of resources were available to develop social capital on their STP. Eleven of thirteen STP respondents answered this question and implied or stated in every comment was the challenge in harnessing the time, money and sometimes staff to carry out what all of the STPs agreed was the principal role of the park. Whilst this was not an easy question for the STPs to address, it is an important question that carries implications far beyond the scope of this paper. Depending upon the geographic location of an STP as well as its political, cultural and historical milieu, the cost of social capital development may at some point outweigh the benefits. Moses Acquaah addresses the complexity of interpersonal relationships, as well as institutional and societal norms in Ghana that define trust and reciprocity. Interaction and reciprocity between businesses, for example, rely on one set of norms that may prove beneficial to SME development, but the social capital that is generated between companies and political or community leaders in Ghana is, according to Acquaah, less than virtuous and cost effective (Acquaah 2008). It is critical for park leadership to consider the cultural and political norms of the community in the context of social capital strategy; moreover, if an STP is international in scope, the complexity of "norms" may require even greater reflection.

Evaluating social capital development efforts
None of the respondents addressed issues of measurement or evaluation and we intentionally avoided the question at this time in order to see if it came up without our asking. Social capital, as the direct or indirect result of marketing communication strategies is not easily measured. One can measure hits on websites, ask how many people read newsletters, county how many attend events

and get a clear picture of how well information is being disseminated and how interested people seem to be. This is foundational information which, over time, also provides an indication of how interested people really are in receiving certain information.

But marketing and communications, while being an absolutely essential component of the social capital development is not the end of the process but the beginning and middle and end. In between, however, are the less tangible results that requires an attentiveness to qualitative feedback from actors throughout the network.

Concluding Remarks
Over the last 30 years, nearly commensurate with the growth of the STP movement, sociologists and economists have been interested in understanding the implications of social interaction on information flow, organizational development, leadership and management, and the stimulation of innovation and perhaps therefore improved opportunities for entrepreneurship and business development.

Responses to the surveys elicited the shared view that STPs have a role to play in fostering a socially cohesive environment as a direct function of what it means to be a science park. In other words, if park staff were not seeking to develop social capital, they would not be doing their jobs. Inherently difficult in this job however is determining ways that make it easier for companies to develop and grow when it is not within the park management's remit to actually perform the work of the company or to ensure its development. Likewise, the strategy for building social capital must necessarily rely on the company's interest and/or willingness to make use of the formal and informal social networks that are created in an STP environment. Barabási (2011) describes this phenomenon of being able to act upon and expand linkages following random meetings as "fitness" (p. 11).

A good social capital strategy, therefore, should include considerations for augmenting opportunities for fitness. In other words, how can STPs help to ensure that social networks actually become "capital" and can be understood as valuable? It is not difficult to measure how many people attend any given social event that might be designed to stimulate strategic meetings, but it is challenging to determine the level (or fit) of social capital that the meetings actually generate. Here, the quality of relationships and how well they inspire trust, not only between park managers and companies, but between members of park staff and the companies as well as between the companies themselves, is important. A social capital strategy must be credible.

STP managers and stakeholders know that companies located on an STP have the potential to leverage local, regional, national and international contact networks more efficiently than if the companies were located on traditional business parks or if they were geographically isolated. The surveys showed that most parks conducted similar activities to one another to promote networking. It is likely that the activities are similar because they have been proven, model after model, to work. But, it is also possible that habits beget habits and that some activities are socially interesting and contribute to a nice atmosphere on the park without generating the kind of social capital that is beneficial to the development of park companies or even to the overall success and development of the park organization itself. Park managers need to review the mix of activities to determine what the anticipated outcomes have been and should be as a means to secure the best possible results and return on "social capital investment". The activities themselves should be strategically designed and mutually reinforcing. They should ensure that the activities reach specified target groups; moreover, they should reduce any barriers that might prevent opportunities for follow up and cooperation between the target groups.

The responses to the survey revealed that many of the respondents did not distinguish between what we might consider was the day-to-day work of the park's management organisation, the communication and marketing strategy, and the development of social capital. Naturally, because the day-to-day work of an STP staff *IS* to keep its companies' satisfied by delivering reliably on services and promises, one could assume that this was enough to encompass the strategic development of social capital. But, delivering reliably on services and promises is the role of every company to its customers, including STPs.

Social capital, optimized, however should be the outcome of these day-to-day efforts that leads to stronger work forces and job creation, improved opportunities for innovation and entrepreneurship, accelerated sales, expanded international networks, and happier, healthier people.

For years, STP stakeholders and management have asserted vigorously that parks are not the same as traditional real estate developments. We agree. The developable social capital of an STP extends far beyond the boundaries of the park itself and the generators of that social capital include the partners, shareholders, and stakeholders, including tax payers, who all hold an interest in the success of the STP—as an engine of sustainable social and economic wealth for the community.

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Mjärdevi Science Park, Linköping, Sweden
Science Park Jönköping, Jönköping, Sweden
Scion DTU Science Park, Copenhagen, Denmark
Solander Science Park, Piteå, Sweden
Tallinn Science Park Tehnopol, Tallinn, Estonia
Tartu Biotechnology Park, Tartu, Estonia
Uminova Science Park, Umeå, Sweden

And we look forward to having the opportunity to work with additional parks in the Baltic Region to continue mapping STP social capital development.

Appendix

Survey sent to respondents in januari 2012:

Science Parks are no longer the experiments that they once were. Managers, stakeholders and park clients have learned a great deal about each other and what they need to build successful innovation environments. "Meeting places" has always been a watchword in the industry, but what these places are, how they are defined, used, and promoted and how well they serve to meet or exceed the park's objectives is not always as clear. We'd like to hear from you on this matter. Your feedback will contribute significantly to a study being done to better understand "social capital advantage" on science parks.

We, Mary Spaeth, a PhD researcher at the University of the West of Scotland, and EvaMarieTörnström, director of communications and public affairs at Mjärdevi Science Park, are collaborating on a study that reviews current literature on social capital as it relates to the science park environment.

We are interested in understanding how and to what extent Scandinavian and Baltic Science Parks might be supporting, creating, developing, and utilizing social capital to advance different strategic goals.

With your help, it is our intent to present our findings, in aggregate, at the 2012 IASP World Conference in Tallinn this June.

We hope too that this short survey (12 questions) serves as a means for you to consider your social capital work in new light and that you will also help us to see our work from new perspectives.

Again, we will publish aggregate data. Your individual answers will be held in confidence and not published without your written permission.

Thank you and enjoy the survey. It should take no more than 30-40 minutes, but you are welcome to spend as much time as you like on the written comments or get back to either one of us with other thoughts at either:

mary.spaeth@uws.ac.uk or evamarie.tornstrom@mjardevi.se

<div align="center">*</div>

1. We'd like to begin with some quick, demographic data. Please tell us your name, title, and role at your science park and a contact email and phone number (for sorting, and in case we have questions).
2. What is the name of your science park?
3. When was your science park founded?
4. What profile does your park have?
5. How many companies are located on the park? (Please give us some idea of their categories--IT, manufacturing, consultancies, research, academic, restaurants, schools, banks).
6. How many people work on your park? (feel free to say more regarding employment objectives and history).

Here, we would like you to tell us about the kinds of activities you support on your science park. Whilst we use our own experiences and even Mjärdevi Science Park as a starting point for our questions, you should feel free to mention activities/strategies that have and have not worked for you and why.

7. (Question 1) What kinds of social capital activities are held in your science park? (choose as many as apply)

Breakfast seminars
Lunch seminars
Dinner seminars
After-hours events
Evening seminars
Half-day conferences
Full-day conferences
Multi-day conferences
Trade association meetings
Rotary, Lions, or other business professionals group
Sporting events
Cultural events
Family events
Start-up events
Not sure
Not applicable
Others (please specify)

8. (Question 2) Of those you chose above, please tell us a little about the event by using the matrix provided. Then in the comment box, please tell us about your events including something about the rationale for having them.

On regular intervals
On irregular intervals
Arranged by the park management
Arranges by other (please specify)
Only open for park companies
Open to others in the community
Only open to specially invited guests

9. (Question 3) What kinds of physical meeting opportunities exist in your park? Please rank the list according to places you believe provide the best opportunity for increased social capital, and of course tell us more in the comment box.

Restaurant
Café/Kiosk
Wellness Center
Library
Open office spaces
Outside open spaces/parks
Do not know
Not applicable
Other (please explain below)

Take a moment to tell us which spaces you think work best and why

10. (Question 4) Please tell us something about your methods of communication and information dissemination. We have listed the most common methods used today, but of course want to know what you think, so please do comment.

Newsletter (digital or print)
Magazine (digital or print)
Posters
E-mail
Intranet
Face-to-face/walkarounds
Facebook

Linkedin
Twitter
We do not communicate
Do not know/not applicable
Other

Daily
Weekly
Forthnightly
Monthly
Quarterly
Annually
To all employees in park
To managers in companies
To all communication managers
To a wider community

11. (Question 5) We know that social capital builds on trust. Can you tell us how you create an atmosphere of trust and confidence on your park?

12. (Question 6) What kinds of resources (time, people, money) are dedicated to developing social capital on your park?