

Science and Technology Parks in the Age of Open Innovation. The Finnish Case

Nicola Bellini^{*}, Jukka Teräs^{**}, Håkan Ylinenpää^{***}

Abstract

The new emphasis on technological platforms, related variety, smart specialization etc. is leading to a substantial (although still incomplete) revision of established conceptual frameworks of the regional innovation systems, including the 'cluster' approach. At the same time, open innovation, as the emerging paradigm in the business literature on innovation, has proved to be a powerful concept, to be used both for analytical purposes and in order to design effective strategies for innovative companies.

The role and development of Science and Technology Parks (STP) in Finland (one of the most dynamic countries in this respect), can be analysed to assess how the concept of 'open innovation' has been accepted and operationalized in the management of Finnish STPs.

Keywords: Open Innovation; Science and Technology Parks; Global Markets; STPs in Finland

1. The Research Question

During the past decade, a number of seminal scholarly works have significantly changed our view on localized innovation systems. The new emphasis on technological platforms, related variety, smart specialization etc. is leading to a substantial (although still incomplete) revision of established conceptual frameworks, including the 'cluster' approach and the idea of 'regional innovation systems'. At the same time, open innovation, as the emerging paradigm in the business literature on innovation, has proved to be a powerful concept, to be used both for analytical purposes and in order to design effective strategies for innovative companies. While increasingly influential within the business practice, it appears quite unclear to what extent this is reflected in changing some traditional

* Full Professor of Management, Scuola Superiore Sant'Anna Pisa (nbellini@sss.it)

** Senior Researcher, University of Turku (jukka.teras@utu.fi)

*** Professor of Entrepreneurship and Innovation, Luleå University of Technology (hakan.ylinenpaa@ltu.se)

approaches to innovation policy and especially to technology transfer from research to industry. In particular present policy practice, namely in the case of Science and Technology Parks (STP), seems to reflect a 'closed system' view of the kind of interactive learning that is supposed to take place within environments such as STPs.

Our common research effort would like to investigate possible ways of implementation of the new concepts and especially of the 'open innovation' paradigm both in policy practice and for future research. In this paper we discuss the hypothesis of a 'new generation' of STPs. Based on a short review of the role and development of STPs in Finland (possibly one of the most dynamic countries in this respect and therefore a potentially very instructive case study), the paper preliminarily assesses to what extent and in what terms the concept of 'open innovation' has been accepted and operationalized in the management of Finnish STPs.

2. Theoretical Issues and Policy Implications

2.1 Science and Technology Parks

A Science and Technology Park may be viewed as a cluster of independent firms and support organizations that it is explicitly knowledge-based and attempts to exploit some competitive advantage in a specific field of technology. Another characteristic is that this kind of cluster normally is related to one or several universities, research institutes or other higher education institutions (HEI's).

The concept of Science Parks first emerged in the U.S. during the early 1950s when Stanford Research Park and the Research Triangle Park were established. In Europe, the first park was established in Edinburgh, Scotland (the Heriot-Watt Research Park) in 1965, but by 1970 there were only 21 Science Parks throughout the world (Haxton 1998). In 1982 the first Science Park was established in the Nordic countries (Oulu, Finland), while the first Swedish park (Ideon, Lund) was established a year later. In 1990 the number of parks had increased to 270, and by 1998 amounted to 473 different science or research parks (McQuess, Haxton 1998). Adopting a definition from UKSPA (a British organization for Science Parks), a Science Park may be understood as a property-based initiative that has formal and operational links with a university, HEI or research center. A Science Park is moreover designed to encourage the formation and growth of knowledge-based businesses and other organisations normally resident on site (Ylinenpää 2001).

Success factors which are often depicted include a favorable image related to the park; access to a nearby, local market for products and services produced in the park; access to suppliers of components and services in the region; a local culture favoring innovation, entrepreneurship and co-operation; access to employees with adequate (and normally high) formal qualifications; access to venture capital and good communications; and an attractive working and living environment. Investigating how successful parks are organized internally also often reveals that they have appropriate, practical and flexible premises allowing their tenants to expand without too much disturbance to ongoing production; shared support-functions such as office services, meeting facilities, information technology support, and services for management support and training; and an 'inner life'

characterized by formal and informal arenas for social interaction – internally between tenants and externally between the tenants and (preferably) university researchers. Most of the characteristics mentioned here may, however, be regarded as ‘necessary but not sufficient factors’ for being successful.

Policy support is normally conditional upon the potential of STPs to serve as a lever for development of its region. This depends on the fact that the STP functions as an attractive and dynamic milieu, providing its members/tenants with favorable conditions for developing new products and services, attracting new customers and entering new and normally global markets. An STP may also facilitate new entrepreneurship and spin-out ideas from the region’s university. At the same time STPs may be a factor of attractiveness for the area and therefore instrumental to inward investment policies focused on research and high-tech. In so doing STPs may contribute to the development of non-metropolitan, rural areas or to the reconversion of old industrial regions. A variety of strategies can be functional to the realization of these kinds of impact. In ideal type terms, one possible strategy (which can be labeled as ‘incubator strategy’) may focus on creating as favorable conditions as possible for commercialization of research-based ideas in the form of spin-out companies from universities and other HEI’s. Alternatively, another strategy (an ‘attraction strategy’) can be to attract established and larger corporations to locate knowledge-intensive divisions or units in a park and close to the expertise and the recruitment base that a university represents. Of course, the two strategies may characterize different stages of the STP lifecycle (Ylinenpää 2001).

2.2 STPs as Part of a Larger Innovation System

During at least three decades the ‘cluster’ concept has dominated both the theoretical and the policy debate in the field of regional development. Scholarly work has extensively discussed the nature, characters and motivation of the geographical concentration of specialized industries within a line of thought and research evolving from Giacomo Becattini’s and Sebastiano Brusco’s re-discovery of the Marshallian ‘industrial district’ to Michael Porter’s ideal type of clusters, still the most influential conceptualization, also thanks to its policy implications. As it often happens, the workability of the Porterian cluster is not contradicted by its obvious theoretical shortcomings, such as the vagueness of some key aspects (the geographical scale, the dynamics) and the chaotic heterogeneity of the different empirical cases (Porter 1998; Martin, Sunley 2003; Maskell, Kebir 2005; Teräs 2008; Lazzeretti et al. 2012).

The lack of a consistent theoretical framework and definition also reflects the complexity of the dialogue between theory and praxis. The issue of the geographic boundaries of clusters has often seen the juxtaposition of approaches based on economic ‘facts’ (e.g. the travel distance to workplaces) and those ‘policy-driven’, based on the correspondence with the area of jurisdiction of political institutions. In the former case, economic relations define the space of interdependence among firms; in the latter, clusters are in fact a way to define the constituency of the policy makers and a framework to regulate the multiplicity of interests through collective action.

Cluster literature gives an in-depth account of the advantages and disadvantages of clustering. These arguments have a special relevance when clusters are related to innovation processes. The link between innovation performance and the interconnectedness of various actors has been one of the mainstream topics of the cluster discussion, closely related to the literature on Innovation Systems (Malmberg, Maskell 2002). We owe to Phil Cooke (2004) the introduction of the concept of 'regional innovation system' (RIS) that became later an established reference in the literature, together with the possibly less successful 'innovative milieu' approach. Basically these approaches emphasize the role of geographical proximity and of the territory (including its 'soft' elements, like social capital) specifically in order to support knowledge exchanges, spill-overs, learning and innovation.

Cooke (2004, 2007) defines two different types of regional innovation systems: the IRIS (Institutional Regional Innovation System) and ERIS (Entrepreneurial Regional Innovation System). The IRIS, more familiar in Europe, is research and development driven and technology-focused whereas the ERIS, more familiar in the USA, is more venture capital driven and market- focused. Cooke (2007) states that regional innovation systems are not isolated 'islands' but more like 'icebergs', swiftly affected by their global environment, immediate external conditions and internal dynamics.

Cooke et al. (2007) present the main structure of a regional innovation system (see also Tödting, Trippel 2005). According to them, an RIS consists of two subsystems embedded in a common regional socioeconomic and cultural setting. The knowledge application and exploitation subsystem comprises of the companies, their clients, suppliers, competitors, and industrial co-operation partners. The knowledge generation and diffusion subsystem consists of various institutions that are engaged in the production and diffusion of knowledge and skills (public research organizations, technology mediating organizations, and educational institutions). A regional policy dimension includes policy institutions and regional development agencies. Cooke et al. (2007) argue that clusters and RISs can, and often do, coexist in the same territory: 'But whereas the regional innovation system by definition may host several clusters, a cluster is never isomorphic with an RIS.' Tödting and Trippel (2005) state that clusters are central elements of the knowledge application and exploitation subsystem, whilst the RIS is a wider concept in the sense (1) that there are usually several clusters and many industries in an RIS and (2) that institutions play a larger role, institutions in this context referring to innovation relevant organizations, rules and behavioral characteristics of forms and actors. Bellini and Landabaso (2007) make a difference between the 'US cluster a la Porter' and regional innovation policies in Europe mainly because of the different role attributed to public policies. They argue that regional innovation system approaches do not concentrate solely on firms and factor conditions. According to them, it is more appropriate to talk about localized public-private networks, which may have a sectoral, technological or thematic nature in Europe rather than of clusters in a strict sense.

The RIS approach also overlaps with the Triple Helix concept, which was introduced by Etzkowitz and Leydesdorff in the late 1990's. The Triple Helix model includes three key actors of the innovation system: the government, industry, and university, or State, Industry, and Academia. The objective is to realize an

environment with innovativeness, consisting of university spin-offs, tri-lateral initiatives for knowledge-based economic development, and strategic alliances between the Triple Helix actors (Etzkowitz, Leydesdorff 2000).

The general cluster concept includes a wide range of possible companies and industrial sectors. Within a knowledge economy perspective, it is not surprising that a special attention has been devoted to clusters related to advanced technologies and research-based activities. Paniccia (2006) provides a typology of industrial districts and clusters, using Pavitt's categories (cf. Pavitt 1984). The classification includes science-based or technology agglomerations, characterized by e.g. locations for important scientific and communication knowledge infrastructures, rich technological opportunities, the very active role of knowledge institutions, and products with short life cycles. Examples of science-based agglomerations include e.g. Silicon Valley in the US and Sophia-Antipolis in France.

Innovative clusters seem to be peculiarly sensitive to the 'soft aspects' related to clusters, e.g. concerning the interaction between the cluster actors utilising social capital. In this respect, however, the quality of social capital matters. Bonding social capital seems less relevant than 'bridging' social capital (Putnam 2000). Thus Saxenian's (1994) analysis of high technology regions in Boston (Route 128) and California (Silicon Valley) highlights cultural differences, attributing the superior economic performance of California partly to its openness and networking abilities compared to the more closed industrial system in Boston area where the process of technological change is limited within corporate boundaries. Florida (2003, 2005) states that both economic and lifestyle considerations matter in attracting talented workforce to locate and cluster in certain places and namely in urban settings (cf. Cappellin 2011). The chances to attract the 'creative class' to certain places are thus better if the '3T' combination of factors can be provided: tolerance, talent, and technology. In particular, tolerance is defined by Florida as openness, inclusiveness, and diversity to all ethnicities, races and walks of life.

2.3 New and Broader Perspectives

Both regional and innovation studies have recently added new perspectives to research and policy agendas. Recent regional research has had a remarkable impact on the way we look at localized innovation systems, suggesting a greater complexity of systemic interactions and a readjustment of policy approaches. Possibly the most fruitful contribution has come from the research on 'related variety' as a condition for knowledge spillovers, that has given evidence of the importance for economic development of combining different but complementary pieces of knowledge and of expanding and diversifying into sectors that are closely related to the existing ones (Asheim, Boschma, Cooke 2011). In industrial innovation studies 'open innovation' is an emerging paradigm, assuming that 'useful knowledge is widely distributed'. Although the role of external technology and of its inbound flows has been the object of previous scholarly work, only recently research and practice have converged in treating R&D as an open system. Within this framework, open innovation is defined as 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas,

and internal and external paths to market, as they look to advance their technology' (Chesbrough 2006)

All these contributions are in fact imposing the need for a revised and more sophisticated approach to the issue of proximity. The relationship between spatial and non-spatial logic in innovation systems is, more than ever, an unresolved one. Different knowledge bases show remarkably different sensitivities to proximity effects and proximity itself must then be treated as a multi-faceted concept where cognitive, organizational, institutional, social and geographical dimensions of proximity are in play (Mattes 2011). As to 'open innovation', it is obvious that the quality of relationships between actors is crucial, but spatial constraints may limit the potential of innovation dynamics. Thus, in order to avoid stagnation, the regional clusters not only need favorable local conditions but also free and substantial mobility between the cluster and the world around it. They need both 'local buzz' and 'global pipelines' (Bathelt et al. 2004).

Policy implications of this kind of reasoning are quite important. The 'related variety' argument has suggested a departure from traditional 'picking-the-winner' approaches and their shortcomings (mainly the impossibility to predict correctly the future and therefore the tendency to result in un-distinctive strategies picking everywhere the same 'fashionable' winners). Rather policies are required 'to evolve, capitalizing on region-specific assets, rather than selecting from a portfolio of policy recipes that owed their success in different environments'. This is done by focusing on regional 'platforms' (Asheim, Boschma, Cooke 2011).

All this implies that policies looking for 'related variety' opportunities cannot be restrained by geographical boundaries: 'Pursuing such a region-specific policy is not to say that regional policy should rely on the region itself. Knowledge relationships may cross over regional and national boundaries, as they do over sector boundaries' (Asheim, Boschma, Cooke 2011). Non-local (actually a-spatial) networks must complement local clusters (Asheim, Lawton Smith, Oughton 2011). The geographic boundaries of the cluster must then be porous (Rosenfeld 2005). Along this line of thought, territorial systems of innovation 'are overlapping and have open, often fuzzy, borders within embedded regional, national and global systems' and are decisively characterized by their degree of openness (Asheim, Lawton Smith, Oughton 2011).

This is actually consistent with the policy implications of the open innovation discourse. While open innovation has acquired a substantial influence in the strategic thinking of many large and influential corporations, its policy implications have been only partially discussed. For sure, 'many current public policy measures have their roots in the closed innovation era' and open innovation demands, if not a substantially revised policy agenda, at least a different set of priorities, with a new emphasis on the mobility of knowledge workers, on the financial support to new ideas and new business models in the society (rather than to R&D activities by companies), on more efficient markets of knowledge (and in particular on the intermediation functions to facilitate its diffusion) as well as on SMEs and start-ups (Chesbrough, Vanhaverbeke 2011). At the same time, some of the traditional concerns, e.g., about strengthening the links between university and industry find a renewed legitimacy within the open innovation framework (Perkmann, Walsh 2007). The territorial dimension may comprehend, but not constrain the inflows and

outflows of knowledge and policies are required to help companies in looking 'elsewhere', rather than within the internal network of relations.

To maintain, increase, reshape and create beyond-borders relational assets must therefore be added to the objectives of a modern regional economic policy. By identifying 'spaces' that are large enough to include (both quantitatively and qualitatively) significant resources and opportunities, regional and local governments do more than just 'stretch' the idea of regional innovation systems. What is at stake is the opportunity to make open innovation mechanisms more effective and, given one region's technological platform, innovation through related variety more likely, because of a greater range of possible co-inventing industries (Bellini, Hilpert 2012).

2.4 A New Generation of STPs?

The question now is to what extent Science and Technology Parks and the standard toolbox used in establishing and managing them are still able to reflect and operationalize the more complex view of innovation and regional innovation systems that is emerging. While STPs can represent an environment conducive to the kind of interactions envisaged by the above discussion, one may doubt that, by sticking to the original cluster approach, they end up being 'closed systems of innovation'.

If so, we could imagine the emergence of a new generation of 'post-cluster' STPs, where the emphasis on agglomeration and specialization is substituted by variety, transversality and openness (Hassink, Hu 2012). These new STPs should be able to activate wider innovation ecosystems and to work as accelerators and promoters of the external connectivity of the regional innovation systems, by effectively intermediating knowledge exchanges on a global scale. In doing so they should complement their 'real estate' aspects with new skills (more global and outward oriented) and also with new images (and new labels) evoking not closeness (e.g., the 'valley' and the 'park' itself), but openness, such as hub, carrefour, gate, arena...

These are, of course, mostly prescriptive hypotheses. The new catchwords of technology platforms and open innovation are slowly creeping into the strategies and practice of STPs.

3. The Finnish Case: the State of the Art

3.1 Finland – Entering a New Phase

Finland has experienced a rapid growth in the fields of advanced technologies during the last decades. The Finnish innovation system has been able to produce world-class innovation ecosystems contributing to e.g. the exceptional success story of the Nokia company. The innovation infrastructure in Finland, with STPs as essential elements, has developed positively. The latest development in the high tech sectors in Finland, especially the challenges of Nokia and the rapidly decreased subcontractor network of Nokia in Finland, puts the Finnish innovation system under a challenging situation. New approaches and solutions are needed

among the actors of the innovation system – not only the companies themselves but also actors in the innovation infrastructure - to support new high-tech growth in Finland.

3.2 STPs in Finland: an Overview

Science and Technology Parks play an important role in the Finnish Innovation System. The pioneer of the Finnish Science and Technology Parks was the Oulu Technology Park which was established in 1982. In a broader perspective, the Finnish development of STPs largely followed the international trend of many regions in industrialized countries to set up STPs as significant elements of the regional innovation policies since the second half of the 1980s (Hassink, Hu 2012). Finland experienced a boom of Science and Technology Parks in the 1980s and early 1990s when the majority of the Finnish Technology Parks was established (Table1).

Table 1: *The Establishment of the Major Finnish Science and Technology Parks*

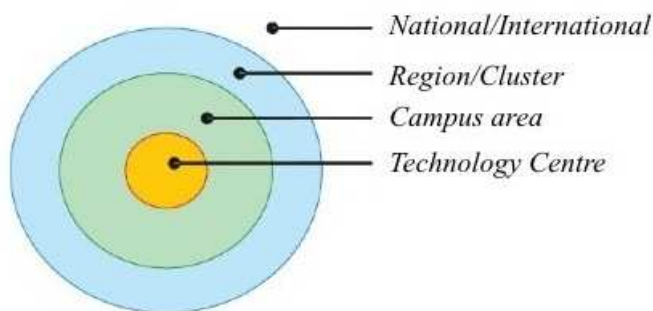
STP	Year of Establishment
Technology Park Oulu (later: Technopolis Oulu)	1982
Otaniemen Teknologia kylä Oy (later: Innopoli, Espoo in the Helsinki metropolitan region)	1984
Karelsk Technology Centre, Lappeenranta	1985
Tampere Technology Centre (later: Hermia)	1986
Jyväskylä Technology Centre	1987
Kuopio Technology Centre	1987
Turku Science Park	1988
Technology Centre Merinova, Vaasa	1989
Joensuu Science Park	1990
Neopoli Oy (later: Lahti Science and Business park)	1991
Helsinki Business and Science Park Oy	1992

Source: adapted from Advansis, TEKEL (2004)

The Finnish STPs have typically organized their activities into three main categories (Koskenlinna et al. 2005): real estate activities and related services, enterprise development activities (e.g. incubators, venture capital programs), and knowledge cluster development programs (e.g. implementation of EU, national and regional programs). Another way to describe the STP activities is illustrated by the

following figure. The operational activities provide office space and some basic office services for the tenants of the STPs. The broader customer group consists of the campus area of the STPs and the related interest groups e.g. universities, research centers, and companies. From the viewpoint of the cities and regions, the STPs play a key role in strengthening the attractiveness of the city/region. The STPs have the national level interest, too, in e.g. strengthening the regional role and impact of the national university system (Advansis, Tekel 2004).

Figure 1: *The Basic Activities of the STPs from the Viewpoint of Innovation System*



Source: Advansis, TEKEL 2004

The role of the STPs in the Finnish innovation system has not been clearly and unanimously agreed (Table 2). On one hand, STPs focus on the success of companies. On the other hand, high hopes are loaded into the STPs in guaranteeing the regional success. In many cases, the STPs are seen as intermediary organizations to meet the multilevel expectations simultaneously.

The Finnish STPs increased their national cooperation in an early stage by establishing TEKEL (The Finnish Science Park Association) in 1988. Today, TEKEL has 29 members. Together with its member centers, it forms a nationwide TEKEL network, which is part of a national innovation system. TEKEL is in charge of co-operation within the TEKEL network, promotes science park development, participates in the implementation of nationwide programs, and actively develops significant national and international networks. In particular, the association co-operates with government ministries, key research institutes, business development organizations, and promoters of internationalization, commerce and finance. It represents Finnish science parks in fields of international co-operation, such as the International Association of Science Parks (IASP). TEKEL finances its operations through membership fees, project work and Finnish and EU project funding (www.tekel.fi).

The Finnish membership in the EU in 1995 strengthened the role of STPs as regional actors in Finland. The best known example is the Finnish Centre of Expertise Programme which was established in 1994 as an important instrument of the Finnish innovation system. The Finnish STPs play the key role in the implementation of the Centre of Expertise Programme.

Until the early 2000s, the large majority of the STPs in Finland were owned by the cities or the economic development companies of the cities where the STPs were located. The Finnish STP structure experienced a radical change when the Oulu-based STP Technopolis started the acquisitions of other STPs in Finland. The consolidation process was an outcome of the change of strategy of Oulu Technology Park. The name of the STP in Oulu was changed into Technopolis, the ownership base of Technopolis was broadened and the company was publicly listed in the Helsinki Stock Exchange in 1997. The expansion period of Technopolis in the early 2000s included a series of acquisitions and changed the working concept and strategy of the acquired STPs into Technopolis concept (Teräs, Ylinenpää 2012). In 2012, Technopolis has more than 20,000 people working in its business centers in three countries, with a total floor area of approximately 600,000 square meters. In Finland, the company operates in Oulu, Espoo, Vantaa, Helsinki, Tampere, Kuopio, Jyväskylä, and Lappeenranta. Out of the STPs of major Finnish university cities, only Turku STP is not owned by Technopolis. There are several locations in each city. Oulu, for example, has five Technopolis locations in different parts of the city. In addition to Finland, Technopolis has premises also in St. Petersburg, Russia, and Tallinn, Estonia (www.technopolis.fi).

Table 2: *Examples of Intermediary Organisations*

	Goal	Basic Function	Example
National -macrolevel	The success of Finland	The build-up of the control mechanism	Sitra, Tekes, Academy of Finland
Regional -mesolevel	The success of the region	Co-operation, networking	Municipal organizations, incubators, centers of expertise
Local -microlevel	The success of the companies	Development of knowledge and know-how	STPs, KIBS companies, universities, universities of applied sciences

Source: Koskenlinna et al. 2005

3.3 Recent Trends and Some Examples

The Finnish STPs have experienced a considerable transition from local real estate providers to value-added service providers and implementers of various

multi-actor programs such as the Centre of Expertise program. Moreover, the mission of many STPs has changed significantly, one of the major reasons being the increased role of Technopolis in the Finnish STP field. Despite the changes, one of the basic ideas of the STPs has, however, remained the same from the viewpoint of innovation policy: to provide an innovation environment for actors to co-create new products and services. One would presume that concepts such as open innovation are likely to gain support in a STP environment. What is, then, the current situation in the Finnish STPs regarding new approaches to promote innovation, especially open innovation?

The Finnish STPs, and more generally the Finnish intermediary organizations of innovation systems, have not been studied intensively so far. According to Konttinen et al. (2009), there are currently 80 regional development organizations, 22 technology centers, 70 incubators and 40 other innovation support organizations in Finland acting as intermediary organizations. Konttinen's et al. (2009) study however claims that such well developed support infrastructure do not guarantee successful commercialization of research results in Finland. A VTT (2009) evaluation revealed the following major challenges regarding the connection university-intermediary organization, often referred to as one important element in STP operation:

- doubts regarding the internal innovation services provided by the universities
- unclarity about the intermediary organizations and their roles
- loss of commercialization potential
- unwillingness to commercialize the research results
- disappointments regarding the intermediary organizations (e.g. high rents of technology parks, insufficient incubator services, lack of ability to attract venture capital into the region).

Technopolis, the leading STP actor in Finland, aims to change Technopolis to become a 'smart park'. As Mr. Keith Silverang, the CEO of Technopolis, says: 'The evolution into a smart park means above all a transformation of Technopolis mission: from offering premises and services for success into proactively creating and promoting an ecosystem of growth in its locations. The challenge is to make the entire community operate in a more growth-oriented, profitable and cost-efficient way. We are encouraging and guiding all those in the ecosystem towards cooperation. When everyone works together, they achieve significantly more than they could on their own. The whole becomes more than the sum of its parts,' (www.technopolis.fi) Although not using the term 'open innovation', the transformation of Technopolis mission is a step towards an increase in 'open innovation' thinking and actions in the Technopolis Group and its STPs. TEM (2009) provides a list of such new approaches to generate and promote innovations:

- innovation forums (creating interaction and providing new insights among and between companies, public sector, and researchers),
- innovation platforms (cooperation projects to gather local companies and universities under the same innovation project),
- living lab-environments promoting and testing user-driven technologies and ideas,
- test beds to test new technologies in cooperation with companies and research organizations (e.g. Helsinki Testbed for weather monitoring technologies),

- innovation partnerships (equal partnerships instead of subcontractor relation only),
- open innovation projects and environments,
- open source software (Finnish-based Linux as an example),
- innovation communities,
- communities of practice.

Most of the listed approaches have been used by the Finnish STPs. The key common denominator is the user and customer driven approach. According to Lehenkari et al. (2009), the input from the public sector in the introduction of the new innovation approaches listed above has been significant in Finland.

The Innovation Mill program is maybe the most well-known open innovation initiative involving the Finnish STPs so far. The program offers access to the Finnish telecommunication company Nokia's unexploited business ideas and related Intellectual Property Rights, facilitates new opportunities to speed up business development and related financing services. Initially launched in 2009 by Nokia, Technopolis, and Tekes (the Finnish Funding Agency for Technology and Innovation), this three-year programme is coordinated by Technopolis while funding is provided by Tekes and Technopolis cities around Finland. Today about 4,000 drafts of business ideas and related IPRs are stored in a central Nokia database. Applicants who want to make use of this resource do not have direct access to the database. Instead Technopolis screens the database, based on the needs of the company which has expressed an interest, and the specific requirements and options are discussed beforehand between the interested party and Technopolis. The focal areas of the IPR pool are applications, services and products relating to Near Field Communications, Environmental and Energy Related Solutions, Health Care and Well Being Applications, Location-based Services, Mobile Security, Future Internet Services. Business ideas which are identified and assessed as suitable for the applying party can get co-financed by Tekes with a grant of up to € 75,000. The applicant must however provide self-financing covering 25-50% of the costs. The ideas are presented on ready-made project templates, and they are provided free of charge. Tekes reserved a budget of at least € 5 million for the years 2009-2011 for co-financing projects under the 'Innovation Mill' programme to be used for activities such as integration of the new IPRs into the existing technology, market studies, pilot runs and business development. During the first 18 months of the programme, 27 ideas were submitted for further development. 18 new companies have been established in this context to develop the idea. Technopolis has discussed with 450 companies who have expressed an interest of utilizing the database for developing new products or services. The project portfolio generated in the first 18 months amounts to a value of about € 13 million, of which about € 10 million were provided by venture capitalists and business angels. A basic idea is that the 10 partner cities of Technopolis support the financing arrangement (<http://www.proinno-europe.eu/inno-grips-ii/newsroom/finland-innovation-mill-project-nokia-and-technopolis>).

Also some other policy initiatives to promote entrepreneurship and innovation may be related to STPs, and especially to STPs that have a strong relation to the university sector. Two such examples are Demola in Tampere and Aalto Design

Factory in Helsinki. Demola in Tampere is an open innovation initiative where university students develop product and service demo concepts together with companies, thereby creating new solutions to real-life problems. The Demola concept was created jointly by Nokia Innovation Center and Tampere Technology Centre Hermia, and where the seed money came from Hermia Technology Centre (TEM 2009). Demola works on projects in the area of technology, services, digital media and games, social innovation and business concepts with local impact and global market potential. Companies bring their project ideas for student teams to cultivate. Demola offers the teams the tools and the teams design the solutions collaboratively. Results are honed into real products and services to be part of the companies' operations or spawn new companies (www.demola.fi).

Demola provides an inspiring milieu of creative co-creation and new learning opportunities for students and professionals of different universities and organizations, and the immaterial property rights of the results stay with the multidisciplinary student teams. Companies can then purchase the rights or license the products or services from them. Demola also creates new spinoff companies around the innovations. During the first three years of activity over 200 service and product prototypes were co-created by more than 1,000 students and 93% of the results were claimed for business use. Currently, the Demola concept has also been introduced in the city of Oulu.

Aalto Design Factory is another significant open innovation initiative with national and international visibility. The Aalto Design Factory is located in Otaniemi in the immediate vicinity of the Technopolis Espoo, and was opened as one of the projects of Aalto University in 2008. The Aalto University was created from the merger of three leading Finnish universities: the Helsinki School of Economics, Helsinki University of Technology and The University of Art and Design Helsinki.

The mission of Design Factory is to develop new creative ways of working, new spatial solutions, and enhanced interdisciplinary collaboration to support world-class product design in education, research and practical applications. This is an innovative environment for finding, incubating and realizing new ideas together with leading scholars, top future talent, and a mixture of other companies. Additionally, the Factory offers not only the facilities and tools for different working modes and prototyping, but also a great window-display through a steady flow of visitors and high profile events. Companies affiliated closely with the Design Factory include supporting partners and Aalto University start-ups. All partners are committed to continuous development of the Factory as well as to an open innovation policy (www.adf.fi).

Innovation Mill, Demola, and Aalto Design Factory are all promising examples of how the open innovation Approach is implemented in the Finnish STP environment. It has to be stated, yet, that the term open innovation is not too widespread in the Finnish STP enterprise environment. The term open innovation is used more commonly in the academic sector than in the company sector. open innovation type initiatives are hence relatively common among the tenants of the Finnish STPs, although the initiatives are not often labeled as open innovation initiatives.

4. Finnish Science Parks and Open Innovation: Some Recent Evidence

In order to study the current popularity and usefulness of the open innovation concept in the Finnish STPs, a total of 11 interviews were implemented in July-August 2012. The group of informants consist of 7 representatives of the STPs (or development companies owned by the STPs), 3 representatives of the innovation promotion companies owned by cities or municipalities, and one representative of a research center located adjacent to a STP. Geographically, 4 informants come from the Helsinki Metropolitan region (Helsinki or Espoo), 2 informants from Lahti, 2 informants from Jyväskylä, 2 informants from North Finland (Oulu region, Kemi), and 1 informant from East Finland (Pori). Out of the organizations of the STP informants, all but one are members of the Finnish technology Park Association TEKEL¹.

The interviews focused on three main issues. Firstly, the informants were asked to describe the most important open innovation programs, projects, and initiatives in the respective STPs and their immediate innovative environment. The role of the STPs in the open innovation activities was of specific interest. Secondly, the informants were asked to evaluate the open innovation concept and activities both from the viewpoint of the STP organization and from the viewpoint of the tenants of the STPs. How and to what extent have the STP companies adopted the open innovation concept? Thirdly, the informants were asked to give their opinions on the expected role of the STPs in the future regarding the promotion of open innovation initiatives.

The group of informants of this study did not include the tenants of the Finnish STPs. The interviews included, however, comments about the perceptions of the tenants regarding open innovation. A large majority of the informants work regularly, if not daily, with companies located in the Finnish STPs. The informants have thus gained a relatively profound understanding of the activities and needs of the tenants of the STP also regarding open innovation activities.

4.1 STPs in Finland and Open Innovation Activities in 2012

All Finnish STPs that participated in the interviews currently have or recently have had open innovation programs, projects, or initiatives in their STPs. The Finnish innovation system, including STPs as one essential element, have a long tradition of multi-actor projects and public-private sector cooperation, but the first open innovation labeled activities took place in 2005-2006. The open innovation concept was widely introduced in the Finnish STPs in 2008-2009 when numerous STP's promoted open innovation initiatives.

'Our first open innovation project took place in 2005-2006 – our team just did not call it open innovation. Then, one person in our organization introduced the new open innovation concept and open innovation thinking to our organization.'

'We have had open innovation activities at least for five years. What is even more important is that our regional innovation system has had practice-based innovation on our agenda for even longer time.'

The Finnish STPs have initiated and catalyzed or participated in a range of open innovation projects. The open innovation activities of the Finnish STPs that the informants mentioned can be divided into three main categories:

- initiating open innovation activities: matchmaking activities to enable the kickoff or beginning of open innovation activities. Practically all informants listed the matchmaking events such as e.g. Business Breakfast as an important first step towards open innovation cooperation.
- short or medium-term activities - to start and test the initial idea of an open innovation approach. The open innovation projects, typically 1-2 year activities, are often co-funded by public sector through EU, national, or regional funding.
- long-term open innovation activities – with a vision to create sustainable competitive advantage through open innovation process. The long-term open innovation programs, sometimes but not always initiated by the 1-2 year project phase, have a long-term approach and a strategic viewpoint in forming alliances. Based on the interviews, there are several examples of fruitful open innovation initiatives and open innovation flagship programs to be identified in the Finnish STP environment, e.g. Innovation Mill and Design Factory.

According to the informants, the big companies often play an important role in the open innovation initiatives related to the Finnish STPs. Multinational companies, e.g. Nokia, have provided the STP environment with a flagship feature and visibility often needed to create the open innovation initiative. The non-metropolitan STPs took up the handicap of not having locomotive companies and/or the sufficient number actors in the STP and in the region to enable fruitful open innovation activities.

‘We introduced the open innovation in the STP but cooperation with the Nokia company formalized the large-scale open innovation activity – with the Innovation Mill as the brand’.

‘open innovation activities in the STP environment require a certain critical mass. You just can’t create the open innovation activities with too few players’.

Open innovation initiatives are often created in the ‘ecosystem’ consisting of universities, companies, and a STP – but not always inside the STP. It is often the persons and their personal networks - more than the formal inter-organizational network - that are crucial in setting up open innovation initiatives. Some informants emphasize the importance of proper organization and sufficient physical proximity of participants in order to implement successful open innovation processes.

‘What is essential is bottom-up thinking. Open innovation requires experienced key persons with their wide networks to gather the proper open innovation team. You need super networking people, often not-too-young experts that are willing to pay back to the innovation system something they have gained during the years’.

‘In practice, you need to get the key persons to work at same laboratory or office, and I mean that they should share the same office. If people just meet each other in the meetings the open innovation process loses part of its effect’.

4.2 Open Innovation Concept from the Viewpoints of STPs and Tenants

The large majority of the informants have a positive attitude towards the open innovation concept. Some informants stated, however, that the open innovation concept is still a bit vague in the Finnish innovation community despite a lot of open innovation talk.

‘We experienced a hype on the open innovation concept in 2008-2009; today, I think, some people are already a bit tired with it ...In any case, compared to e.g. Living Lab concept, open innovation is much more understandable and useful’.

‘Open innovation... 2/3 of the people involved don’t know exactly what open innovation means. Public sector categorizes open innovation as a project. Open innovation should mean concrete action, instead, not just running the project’.

‘Why do we have a wide range of open innovation activities? Our region has not enjoyed the basic national research funding allocated to university cities. Search for additional funds has driven us to numerous cooperations and open innovation projects. This has been a positive development for our city and our region’.

‘At our STP, the large majority of the companies still employ the Closed Innovation model. Innovation as a concept is not too familiar to all our companies, either’.

According to the informants, a significant proportion of the tenants of the Finnish STPs do not have open innovation activities. The STP companies are pragmatic in making their decisions to participate the open innovation initiatives. The companies prefer concrete action that is clearly related to their core activities. In fact, a lot of companies implement open innovation activities – without labeling them as open innovation activities. Some informants mentioned difficulties with the university spinoffs and open innovation, due to e.g. lack of commitment and prioritization in commercializing the research results. It was also mentioned that some experts without sufficient knowledge or experience on open innovation projects might regard a nomination to open innovation project team as a threat to their regular work position. Despite difficulties, many companies have adopted the open innovation concept and use the STP as one chain in the innovation link.

‘Open innovation activities are not currently any mainstream activities at our STP. We do have, however, open innovation seminars and other events’.

‘Companies in our projects, they are rather impatient with this innovation jargon and rhetoric. Instead of these ‘song and play’ innovation sessions, the companies are looking for concrete action fitting into their key businesses’.

‘Our university spinoffs simply lack commercialization skills and even an entrepreneurial attitude. This makes open innovation activities difficult to perform. These researchers get their salary from government, so company activities are often priority number two for them’.

‘Why do some of our companies participate in open innovation initiatives? Simply because they have realized that more and more innovations are service innovations and not technology innovations, a bunch of expertise is needed from outside the own organization’.

‘Open innovation is still somewhat unknown concept, and one of our companies reported that their experts hesitate to join the open innovation team; they are afraid of gradually losing their place in the organization’.

4.3 Expected Future Role of STPs Regarding Open Innovation

According to many informants, the overall role of the Finnish STPs in the regional innovation system is expected to become stronger in the forthcoming years. They claim that the demand for the traditional role of the STPs providing value-added services other than real estate is growing – after a period of diminished

focus on innovation promotion, which was caused by the structural change, or privatization of many Finnish STPs in the early 2000s. The non-metropolitan regions, according to the interviews, are more dependent on STPs in creating open innovation opportunities than larger cities. The large majority of the informants saw an important future role for the STPs in enabling the open innovation activities by matchmaking and financial expertise. The complexity of the coordination of the open innovation projects, including funding arrangements, pinpoints the need of STPs in the open innovation network.

‘The STPs have their role in the future regional innovation activities if only they take that role. Simply the complexity of applying and managing public sector co-funded projects highlight the need to have experience from STPs in open innovation activities’.

‘If the ownership and organization of STP activities is too closely related to the city, you can expect rigidity problems’.

4.4 Concluding Discussion

Based on the interviews, the following conclusions can be made regarding the current popularity and usefulness of the Open innovation concept in the Finnish STPs:

- Open innovation concept has penetrated relative deeply into the Finnish STP community. There are numerous examples of fruitful open innovation initiatives to be identified in the Finnish STP environment. The flagship projects (e.g. the Innovation Mill project) are international good practice examples of Open innovation cases. However, a significant proportion of the companies of the Finnish STPs still don't apply open innovation concept in their activities;
- The results of previous studies of Finnish Science Parks (e.g. Squicciarini 2002) have indicated that locating inside a science parks positively relates to the tenants' innovative output performance. So far, however, it is not possible to say whether the relative amount of open innovation activities is significantly higher in the STP environments compared to innovative environments outside the STP environments. Of course, this is a challenge for future research;
- To promote open innovation principles to be more explored by STP tenants, Finnish STPs rely mostly on matchmaking, assistance in fund raising, and project management.
- The open innovation activities are more likely to prosper in larger innovation environments, like large cities with their 'knowledge hub' characters (Penco 2011). There seems to be a critical size of the STP innovation environment where broader and deeper innovation environments with more potential actors are likely to more easily allow for open innovation cooperation. However more limited innovative milieus outside metropolitan areas with limited local resources and competences are specifically the environments that are expected to benefit most from collaborating with external sources of expertise. This paradox represents an interesting challenge for future research;
- Big companies provide publicity and credibility to open innovation projects. Multinational companies such as e.g. Nokia provide the STP environment with a flagship feature, visibility, and credibility often needed to create the open innovation initiative. Reliance on few big companies may include risk, too; e.g.

recent Nokia job reductions in Finland may jeopardize some of the new open innovation initiatives and projects of the STPs. At the same time, the challenges and sudden job reductions may open up new Open innovation needs and possibilities;

- It is often the persons and their personal networks - more than the formal inter-organizational network - that are crucial in setting up new open innovation initiatives. open innovation is a bottom-up phenomenon - the critical success factor of the STPs in creating the open innovation networks is their ability to attract and keep networking champions, i.e. experienced individuals with exceptional abilities, to create and nurture new open innovation networks.

The Finnish STPs have played a big role in the Finnish innovation system in the last decades with a focus on, e.g., knowledge-intensive cluster development and EU-related programs. It remains to be seen how the role of the Finnish STPs in the Finnish innovation system is going to change in this aspect and how this affects the open innovation type activities catalyzed and supported by the STPs. The recent structural change in the ownership of the Finnish STPs 'forced' many STPs to focus more on financial targets set by the new owner. The challenge remains: should STPs be private actors in a regional innovation ecosystem or should the leading municipalities and/or the region have significant ownership and power in the decision-making of the STPs in order to maximize the overall benefit of the STP activity in the region? Which ownership structure would be most beneficial to support new approaches such as e.g. open innovation? Based on the interviews, the Finnish STPs have an important role in the foreseeable future in promoting open innovation activities. They should, however be able to meet the concrete needs of the potential cooperation partners and avoid a 'talk-only' approach to open innovation.

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Notes

¹ Regarding the professional roles of the informants: within STPs, 3 president/CEO level, 3 Vice president level, and 1 Project Management level; within Innovation promotion companies, 1 president/CEO level and 2 Vice president level. The informant of the Research centre adjacent to STP is at Senior advisor level.