CASE FINLAND, TAMPERE: OPEN INNOVATION PLATFORMS AS POLICY TOOLS FOSTERING THE CO-CREATION AND VALUE CREATION IN A KNOWLEDGE TRIANGLE

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Abstract

This case study report focuses on the emerging role of open innovation platforms (OIP) as a policy measure fostering the convergence of innovation, education and research activities. Under the broad label of knowledge triangle (KT), the case study introduces how inclusive and open co-operation is organized to value creative innovation processes through open innovation platforms. The main hypothesis is that evolution from science parks and cluster (sectoral)-based policies with science-based and semi-closed development projects led by a few big companies are moving towards more agile and user-driven processes of innovation, in which open innovation and platform models are key elements of the new practice. Open innovation platforms provide a new generation of co-creation spaces facilitating the interaction among research, education and innovation through a bottom-up process. Recently evolution has extended from local activities towards regionally linked networks of open innovation platforms (the Tampere region) and further to the national policy agenda (the national 6Cities strategy). The value proposition of the OIP approach is to engage a much broader knowledge base for innovation activities while offering the "city as a living lab" and user-oriented open innovation services for the use of firms and other actors (clients). Further, it organizes the increasingly open public databases and public procurement practices to enable both new business applications and the development of public services in this context. The city and its various communities thus work as a living lab and a reference environment for companies.

Data were collected as part of the 6Cities ERDF-funded project (2015–2018). The case is based on 37 meetings/interviews (conducted by February 2016) with policy makers, developers and other stakeholders. The data also included relevant documents (e.g. assessment reports and evaluation reports).

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This case study report focuses on the emerging role of open innovation platforms (OIP) as a policy measure fostering the convergence of innovation, education and research activities. Under the broad label of knowledge triangle (KT), the case study introduces how inclusive and open co-operation is organized to value creative innovation processes through open innovation platforms. The main hypothesis is that there is an evolution from science parks and cluster (or sectoral)-based policies with science-based and semi-closed development projects led by (a few) big companies towards more agile and user-driven processes of innovation. Here open innovation and platform models are key elements of the new practice. Open innovation platforms provide a new generation of co-creation spaces facilitating the interaction of research, education and innovation through bottom-up processes. Recently evolution has extended from local activities towards regionally linked networks of open innovation platforms (the case of Tampere region) and further to the national policy agenda (the national 6Cities strategy). The evolution has been spurred by technological transformations in Internet technology and digitalization and the related emergence of Internet-based platform business models shaping the socio-economic and business environment of innovation activities and of the KT more generally.

The value proposition of the OIP approach is to engage a much broader knowledge base for innovation activities while offering the next step in the "city as a living lab" and user-oriented open innovation services for the use of firms and other actors (clients). Further, it organizes the increasingly open public databases and public procurement practices to enable the development of both new business applications and new public services in these contexts. The city and its various communities thus work as a living lab and a reference environment for companies**.** Importantly, the platform approach *moves beyond the living lab concept* and stresses the importance of network effects and users for mutual value creation in the open innovation activities facilitated by the platforms**.**

Data were collected as part of the 6Cities ERDF-funded project (2015–2018). The case is based on 37 meetings/interviews (conducted by February 2016) with policy makers, developers and other stakeholders. The data also included relevant documents (e.g. assessment reports and evaluation reports). The key conclusions from the case study include the following observations.

The national system in Finland has rather weak mechanisms to support the knowledge triangle-based policies in terms of funding mechanisms of HEIs. Especially basic funding from the Ministry of Education and Culture lacks such measures. In the case of innovation-related funding from the major agency, Tekes, there is also a severe lack of incentives to link education with innovation or research, while the incentives to support industry–university collaboration are strong.

The key question related to the OIP's role in the KT and innovation policy design is more systemic than organizational. The co-creation practices discussed in the case studies (e.g. Demola, MIC) and even the well-organized set of these practices in the developing country context (e.g. Campus Arena, New Factory) are not necessarily fully new phenomena as such. However, *implementing a systemic approach and comprehensive policy design* to deploy and develop these "open innovation engines" and their constellations as "innovation factories" would renew the landscape of regional innovation policy in many countries, including university–industry collaboration and student engagement (KT). OIPs offer tools to build institutional capabilities to leverage the societal impact through systemic and comprehensive policy design. Further, the link to the KT includes the emergence of new environments for open innovation activities designed especially for students of HEIs. Examples from the case of Finland (Tampere) introduce the following:

- the OIP environment serving different categories of HEIs, including a technical university, social science-oriented university and university of applied sciences, which has been able to scale up its business model globally to over ten locations, including Africa and Latin America (*Demola*);
- the OIP environment that is based on partnership between local businesses, a university of applied sciences and a provider of business premises in the field of media, closely linked to the urban and social development challenges of the surrounding neighbourhood in the context of the KT (*Mediapolis*);
- the OIP environment on the campus of a technical university that seeks new solutions to organize its university–industry collaborations and link activities with students and education (*Campus Arena*).

Finally, the future challenges and systemic sore spots may be simplified to the following five themes: 1) emergence of OIP networks, 2) OIPs' capability to create "network effects" and foster civic engagement further, 3) cultivation of an open innovation culture among the local firms, public organizations and start-ups, 4) integration of the OIP approach into education and research among the HEIs and 5) and capabilities to offer the public sector's open data and public procurement processes as new sources for innovative business development and public service renewal.

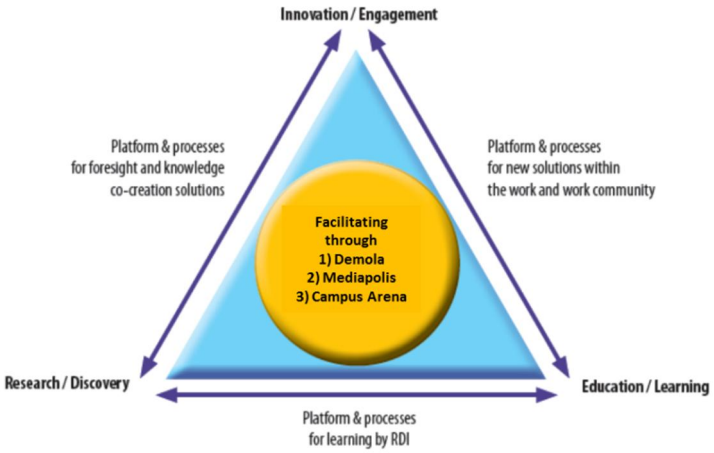
1 KT policies and strategies in Finland

1.1 KT and OIP approaches in this report

The knowledge triangle (KT) approach emphasizes the linkages between education, research and innovation. The KT places HEIs at the core of innovation ecosystems, and their performance is interpreted as crucial in scaling up national and even European innovation performance. However, there is still a lack of illustrative examples of what KT is in practice and at the university level in real life (Markkula, 2013, 11). The case study introduced in this report exemplifies the KT approach, which is applied not only at the institutional level but also at the regional level as a joint effort of three HEIs and further as an attempt to develop a national policy design that leverages the "people" dimension of the KT beyond students to citizens and users more broadly.

To distinguish the KT from more established university–industry–government models, like the triple helix (e.g. Ezkowitz, 1993), we chose to focus on two phenomena that the KT approach stresses and that are crucial elements in the most recent HEI-related innovation activities in Finland. Firstly, the open innovation and open co-creation activities represent the emerging logic that should be applied in both external relations and internal interactions of HEIs when university–industry–society collaborations are organized. This suggests that the collaboration culture of the HEIs should abolish silo structures or at least make them more porous. Secondly, a more human-centred model, adding the fourth P ("people") to the PPP (public–private partnership) models, should be applied. Not only firms but individuals are relevant to policy implementation. The new types of environments for interaction fostering an open innovation culture, communality and a collaborative way of working in the process of development may be labelled as *innovation platforms* in this context (Markkula, 2013, 17, 22). Innovation platforms facilitate the open innovation and co-creation processes between education, research and innovation. This case study focuses on three OIPs in Tampere (Finland): *Demola*, shared by all three HEIs in Tampere; *Mediapolis*, hosting the University of Applied Sciences; and the *Campus Arena* locating on the campus of Tampere University of Technology (Figure 1).

Figure 1. Innovation platforms organizing the interaction between education, research and innovation (adjusted from Markkula, 2013)



The KT framework provides a loose point of departure for the case study at hand but does not define the *innovation platform* in detail. To enable a meaningful discussion, we provide theory- and practice-based working definitions of open innovation platforms (OIPs). In the KT context, OIPs may be seen as a collaboration model that HEIs may deploy when they interact with the surrounding society and economy, that is, fulfil their "third mission".

The OIP discussion is fuzzy and dispersed in the literature and even more so in policy and real life. Thus, the case study at hand is linked not only to one but to a few academic discussions and literature streams. *Open innovation* as such has been discussed extensively during the last two decades (Chesbrough, 2003; von Hippel, 2005), and fairly solid, clear and commonly shared ideas and concepts exist for both academic and practical discussions. Among the noteworthy concepts that complement the discussion, still in a coherent manner, on the innovation side is the "lean-start-up" approach and its emphasis on shorter and more agile innovation processes (e.g. Ries, 2011). Instead, the concept of a *platform* is much more ambiguous.

In the knowledge-based regional economic development literature, the concept of an innovation platform refers to a policy design fostering *related variety*. The theory on related variety suggests that combining different knowledge bases (synthetic, symbolic and analytical) fosters innovation activities between the different sectors and technology bases. This emphasis on "horizontal knowledge flows" and enabling the integration of different knowledge bases distinguishes the platform approach from the cluster approach in knowledge-based regional development (e.g. Cooke & De Laurentis 2010). This rather ambiguous and abstract definition draws, however, only a fine line between the OIP and the cluster approach. To make the line a little more visible, it may be claimed that the stronger role of people and openness in the OIP approach also distinguishes the policy design from clusters (Raunio et al., 2013; Kautonen et al., 2016). Importantly, the cluster and OIP approaches are not mutually exclusive; rather, they may be overlapping and complementary, and the actors in clusters may, for example, extend their activities by setting up open innovation platforms.

In the management literature it is possible to find more tangible interpretations, which distinguish the concept of platforms from the other modes of organization. In most cases a platform is used to define how to organize the production- and innovation-related interactions with external partners (e.g. Gawer 2009; Thomas et al, 2014). The concept of a *platform* has been used in various contexts to define the modes of co-operation that usually open up the process for new actors and consider new forms of value creation. These include technological product platforms (e.g. iPhone), value chain platforms and industrial platforms (e.g. the car industry). More recently a platform has been used to describe the Internet-based business models deployed on digital platforms (e.g. Facebook, Uber) on which value creation is highly dependent on their ability to attract users and/or developers to use the platform (network effects) (e.g. Choudary, 2013; Haigu, 2014). The capability to attract users/developers who create value for the platform is a shared concern in all platform approaches to various degrees.

Despite the fact that the regional economic development-related discussion remains a fairly abstract level of related variety of knowledge bases (e.g. Asheim et al., 2011), it provides the profound observation that platforms have to integrate different knowledge bases, actors and technologies. The management literature, again, offers some interpretations of how to organize this rendezvous in digital and physical environments in more detail and how to make it a profitable activity. A platform enables organizational models to coordinate open innovation processes and explains their success and failure factors. An important opportunity that the platform approach includes is that platform owners do not produce all the key products, innovations or services on the platform but facilitate the process *whereby users of the platform provide the most value for other users of the platform*. They may be developers providing new applications for iPhone users or they may be Uber drivers offering a taxi service to Uber clients, who may be drivers themselves. The fact that users are creating value for each other makes it possible to foster network effects; that is, every new user on the platform provides more value for the other users (e.g. Gawer and Cusumano, 2002, 2008; Sawhney, 1998). This, obviously, provides many opportunities for knowledge-based development and KT policy measures.

Finally, it should be noticed that open innovation has many overlapping elements with the concept of platforms as used in the management literature, because platforms in most cases organize co-operation with external partners, frequently in terms of value creation and innovation purposes.

In general, the platform approach reflects the demands of the new socio-technological paradigm, in which megatrends in the digitalization of technology and globalization of the markets also

transform the behaviour in the economy (e.g. a *sharing economy*) and then foster the emergence of new modes to organize co-operation in innovation and production activities. In practice, open innovation platforms as new policy measures should then foster the combination of different knowledge bases and their deployment in innovation activities. However, not only do the different knowledge bases need support to interact but also borders between tacit and codified knowledge as well as between the knowledge bases of public and private actors should be avoided. Then, OIPs should foster the combination of knowledge towards innovative solutions on at least three levels:

The combination of different knowledge bases (synthetic, symbolic and analytical) to foster innovative solutions. Both science- and experience-based knowledge is frequently included in the process, which is visible in the integration of different industries and disciplines representing the different knowledge bases.

The combination of codified and tacit knowledge. *Digital platform* modes that enable a developer community and its users to improve the products through various Internet-based platforms and *physical innovation hubs* that represent the new modes of co-working and co-creation spaces (including living labs) represent the practical solutions that emphasize the different forms of knowledge. The former is *codified knowledge* and the latter *tacit knowledge*, and social capital exists in the innovation process. The community is an integral part of the well-functioning platform, not only as a social community but frequently as a business model, enabling the "network effect" and profitable business of the platform in terms of both digital and functional environments.

The combination of citizens and public services with the development process in business development and innovations. This refers to the extension of knowledge bases to the people and the public sector of the region. In triple helix or KT models, the knowledge of HEIs and research institutions is harnessed to enhance innovation, but in platform modes citizens and the public sector at large are also engaged in the process. In practice, the public sector may for example open its data to developers and potential service providers, who may use them for business purposes, or it may open up its procurement practices to citizens and business to facilitate better outcomes as well as business development from these practices. This also calls for new kinds of public–private partnerships in both the organizing of OIPs and the further service production practices.

In sum, OIPs aim to link more knowledge and learning to the innovation processes than cluster-based policy design does.

1.2 Dual system of HEIs with national coverage

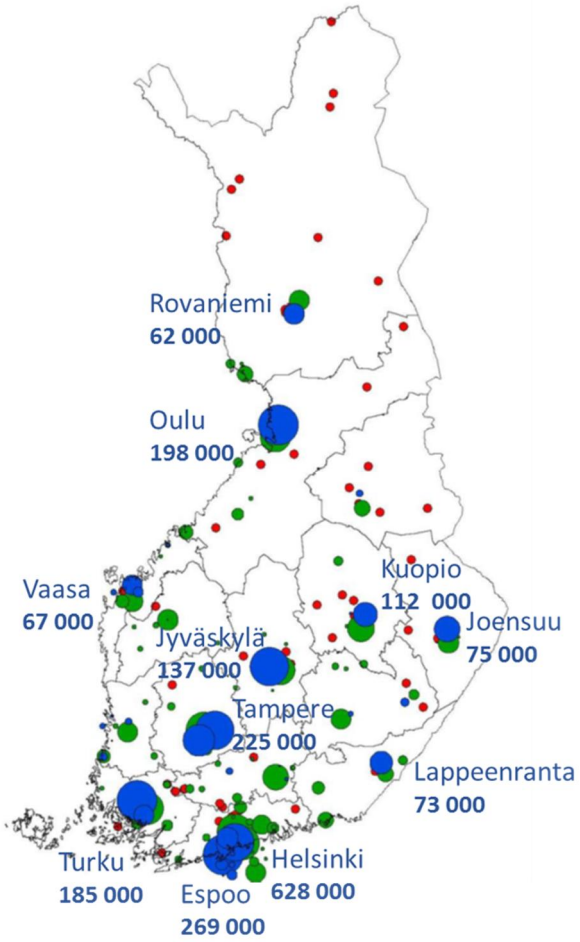
In the knowledge triangle approach, higher education institutions (HEIs) have a central role in fostering the collaboration between innovation, research and educational activities. The first part of the report introduces selected qualities of Finnish HEIs that are considered to be relevant to the meaningful KT-related discussion. The basic starting point is that in Finland HEIs consist of a dual system in which a division is made between *universities of applied sciences* (UASs) or "polytechnics" and (science) *universities*. This division provides two different starting points to link education and research with innovation activities. According to the laws steering the activities of HEIs, the task of the universities is to promote free research and scientific and cultural civilization as well as to provide the highest education with a societal impact, whereas universities of applied sciences should focus on more concrete and local phenomena through competence building for entrepreneurial activities and renewal of the local working life. The linkages between research, education and innovation thus have quite different starting points in the two different types of HEIs.

The dual system includes 14 universities and 24 universities of applied sciences and covers the whole country in geographical terms. Eight major cities have both types of HEIs (except Vantaa, which is the fourth-biggest city but part of the capital city region next to Helsinki), and there are altogether 10 cities with both types of HEIs (Figure 2). The geographical spread is also relevant in terms

of KT activities, as it provides an opportunity to conduct related polices with close linkages to HEIs at the national and regional levels, including rather peripheral city regions with fairly modest population sizes. Beyond the capital region (Helsinki, Espoo and Vantaa) with almost 1.3 million people, there are only 3 city regions (Tampere, Turku and Oulu) with more than 200 000 inhabitants.

The organizational forms of the HEIs also vary and thus provide different links to the surrounding society. The Tampere University of Technology (TUT) and Aalto University in Helsinki and Espoo are private foundations, and the other universities are independent public legal entities. Further, all universities have external boards consisting of relevant stakeholder groups and some representatives of the universities (including students). The external members are a compulsory part of the university management structure that emerged with the law that increased the independence of the universities from the Ministry of Education. The aim is to create stronger links with the surrounding society and consequently to gain more funding from external partners. However, all the universities receive their basic funding from the state budget through the Ministry of Education and Culture. Universities of applied sciences (UASs) are limited companies owned by the municipalities of the region. Therefore, although the universities have commitments to regional economic development, the link between the UASs and the local economic development is much stronger in terms of funding and ownership structures, in addition to their regional development tasks, which are defined in the legislation concerning the UASs.

Figure 2. Location of universities (blue), universities of applied sciences (green) and research institutes (red) in Finland. Major cities with both university types are named and their population size indicated



HEIs enjoy a **wide degree of autonomy** from government steering compared with those in other countries in Europe. (*European University Association's European-level comparison: third in organizational, sixteenth in financial, sixth in staffing and fifth in academic autonomy).* There are no **national programme accreditations**, but universities have the right to award degrees and their educational responsibility is determined by the legislation (universities) and by operating licenses (UASs).

New educational responsibilities are decided by the Ministry based on educational needs. The general objectives, structure and extent of degrees are prescribed in the legislation. In the student selection process, there is also **restricted but equal access** for all through entrance examinations, but the access criteria may vary. However, mostly they are based on matriculation exams and entrance tests. There is no **tuition fee**, but fees will be introduced to non-EU/EEA students in 2016, and they have already been tested with some Master's programmes.

In short, HEIs are fairly independent in terms of organizing their activities. The basic quantities and qualities of the two types of HEIs may be simplified as follows:

Fourteen universities in Finland:

- Enrolment of 168 000 students, of whom 18 000 are doctoral students.
- Universities Act 2010: wider financial autonomy, more active university–business relations, changes in management and administration, performance-based funding system.
- Approximately two-thirds of the funding comes from the state budget, but there is significant variation between the universities.
- The three-cycle system includes bachelor's (3 years), master's (2 years) and Ph.D. (4 years) degrees, in which undergraduate students usually enrol directly in master's degree programmes.
- The target time for a master's degree is 3+2 years, but the average time is 6 years.

Twenty-four universities of applied sciences (polytechnics) in Finland:

- Student enrolment of 148 000.
- Regional development tasks are based on law and UASs are obligated to be in co-operation with business life and working life, especially in their own region. Their applied research activities should serve the working life, support regional economic development and renew its structures (UAS Law §6).
- Bachelor degrees take from 3.5 to 4.5 years.
- Professional master's degrees take 1 to 1.5 years, but a bachelor's degree *and at least three years of working experience* are required.
- Working life is oriented towards compulsory on-the-job training.
- The Polytechnics Act 2015 emphasizes the performance-based funding system.
- The core funding comes from the state; previously it was from the local authorities.

In short, HEIs offer a fairly wide and inclusive national network to link higher education and students with the innovation activities in most city regions of Finland.

1.3 Weak incentives for innovation and entrepreneurship in basic funding

The Finnish HEI sector has a fairly strong position in the knowledge triangle. Finnish HEIs have also been more active in university–industry collaboration than those in other European countries. However, the share of companies that state that co-operation with universities has been an important source of innovation is still fairly small. While the share of the companies co-operating with HEIs is 33% in Finland, only 4.9% of firms in science-based technologies have announced that the university link mattered. Still, both figures are significantly higher than the average among the EU countries (Evaluation of Finnish NIS, 2009; Pelkonen and Nieminen, 2015). In short, HEIs are well engaged in KT activities in Finland compared with other countries, but the impact on firms' real innovative outcomes is still rather moderate.

The link between HEIs and business and the position of HEIs in the knowledge triangle may also be evaluated according to the R&D expenditures that HEIs receive from the private sector. In the case of Finland, the major innovation funding agency Tekes frequently requires co-operation between universities and industry in its projects, which of course has a positive impact on the amount of collaboration (Hyytinen et al., 2012). However, before describing the shares of external research funding, it is important to note that, in the case of the *basic funding* from the Ministry of Education and Culture, similar incentives for collaboration are much weaker or even non-existent.

Figures 3 and 4 provide descriptions of the main basic funding criteria for HEIs from the Ministry of Education and Culture. It may be noticed that the share of funding based on the "third mission" or the fostering of innovation or entrepreneurship are rather modest. In the case of universities, the "nationally competed external funding" includes the funding from corporations, but in practice the vast majority of external funding comes from public sources (the Academy of Finland and Tekes). In the case of UASs, the role of "employed graduates" is slightly more emphasized, and although the weight of *external R&D* is smaller than that of *research* in the universities, it is more practically oriented

and may be considered to be more focused on innovation and the "third mission" type of activities on the one hand and on competence building of the local working life on the other.

Figure 3. Performance-based funding model for universities (Finland Education Evaluation Centre, 2015)

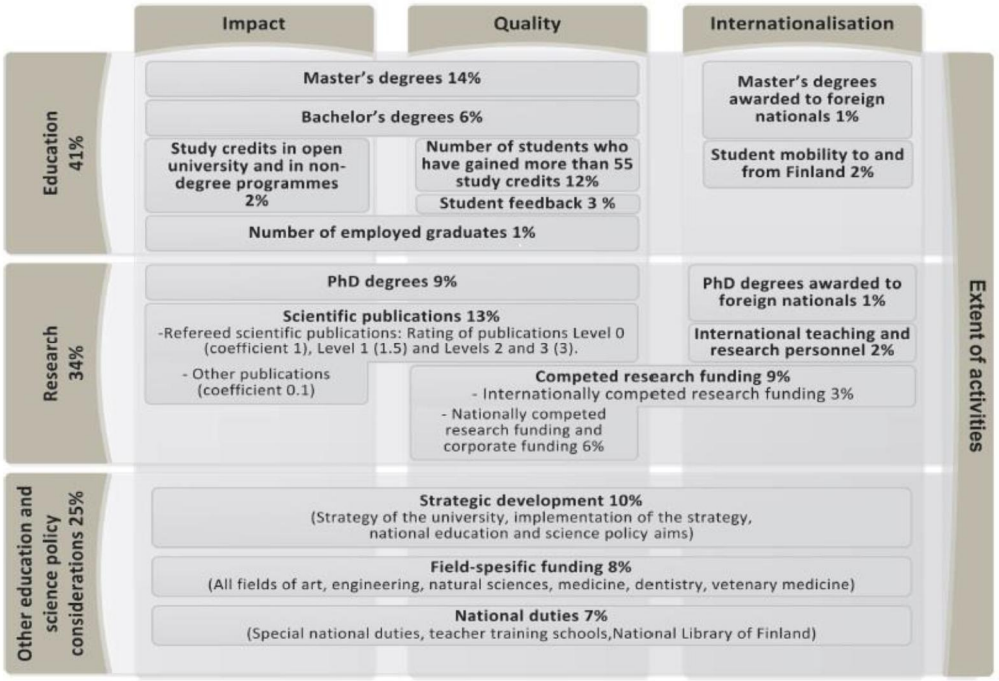
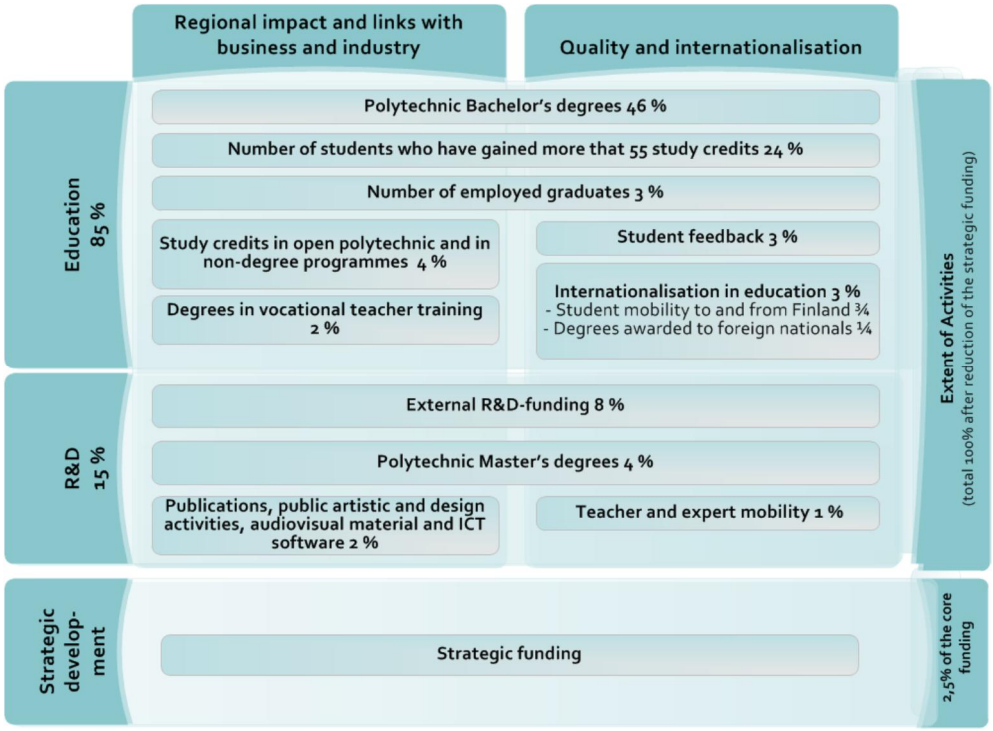


Figure 4. Performance-based funding model for universities of applied sciences (Finland Education Evaluation Centre, 2015)



1.4 R&D expenditures and external funding of HEIs

The R&D expenditure in proportion to the GDP has been among the highest in the world in Finland from early 2000 onwards. Only Israel and more recently South Korea have reached higher shares. The proportion of R&D expenditure of the GDP in Finland peaked in 2009 to 3.9% but then decreased to 3.1% in 2015 (Statistics Finland, 2016).

The total R&D spending was 6.5 billion euros in 2014, 600 million less than in 2011 (7.1 billion euros), which was the peak year in the history of Finnish R&D spending. The major reason for the decline is the lower product development investments in the private sector, whereas the higher education sector and the public sector have reduced their investments only slightly from the top years (Statistics Finland, Research.fi).

In 2014 the investments in R&D by the private sector totalled 4.4 billion euros, which was 68% of the total R&D investments in Finland. In the peak year of private R&D funding, 2008, the amount reached 5.1 billion euros and accounted for 74% of the total funding.

In the public sector, growth continued until 2010, when the R&D investments were 693 million euros, which is 50 million more than in 2013. The HEI sector expanded even further, and the peak year was 2012, when it reached 1.47 billion euros, and then it decreased by almost 40 million euros to 2013 and further during 2014. However, in the HEI sector there was a 50 million euro increase again from 2014 to 2015, while the public sector continued to decrease its investments by 30 million euros.

In sum, the total share of R&D funding has been decreasing mostly due to the falling private sector investments, but the public sector and the HEI sector have also decreased their investments since the peak years, HEIs doing so significantly less and later than the private sector. The next section describes the *share of external research funding* in greater detail regarding both HEI types.

The incentives to co-operate with industry or to conduct innovation-related activities are rather lacking in the basic funding mechanisms, but they are included in the practices of the main public external funding source. Tekes demands and fosters co-operation between the private sector and the universities in its funding programmes. Furthermore, the European Social Fund (ESF) and Regional Development Fund (ERDF) projects encourage co-operation and clearly defined development goals. Tekes's funding concerns especially the universities and latter UASs. The direct funding from companies is fairly modest in the case of both and concentrated on the few technical universities or medical schools among the universities. The direct funding from companies has also decreased during recent years.

In the **science universities** the funding was 1 194 million euros in 2011, and in 2013 it was slightly more, 1 215 million euros, in total. The share of external funding was more or less the same in 2013 (669 m) as in 2011 (672 m), which was around *55% of the total research funding*. Of the external funding, the major share (59%) comes from two national funding agencies: the Academy of Finland (260 m) and Tekes (118 m). National funds, ministries and municipalities and EU programmes are the other key funding sources. The funding from domestic firms was 7% of the total external funding and that from foreign companies 2% (Table 1).

In the **universities of applied sciences**, the research and development (R&D) funding was 164 m euros in 2011 and 167 m euros in 2013 in total. *The share of external funding* slightly decreased from 65% (108 m) in 2011 to 62% (103 m) in 2013. The Academy of Finland (0.4 m) and Tekes (8.5 m) provided less than 9% of the external funding, and the major sources were ministries, which provided 37% (38 m), and the EU's development funds, which provided 33% (34 m) of the external research and development funding. Domestic companies provided 8.7% (9 m) in 2013, which is fairly close to the share that science universities received from companies. In the case of UASs, foreign companies provided only 30 000 euros for research, which emphasizes the much more local role of R&D activities (Table 1).

Table 1. Research funding for HEIs in Finland in 2013/2014 and the main funding sources (million euros)

	Total funding	Total external research funding	Aca-demy of Fin-land	Tekes	Ministries	Domes-tic private funds	Domes-tic firms	EU: FWP	EU: ESF and ERDF	Foreign firms	Foreign other
Universi-ties (2014)	1215	643.1	259.8	118.3	31.5	45.9	44.6	57	25.8	13	22
UASs (2013)	167.2	102.9	0.4	8.5	38	3.7	9.2	2.8	33.9	0.03	0.4
Total	*1382.2*	*746*	*260.2*	*126.8*	*69.5*	*49.6*	*53.8*	*59.8*	*59.7*	*13.03*	*22.04*

(*Source: vipunen.fi)*

In sum, the profiles of universities and UASs differ from each other very clearly in terms of the amount and sources of external R&D funding. Further, the profiles of individual institutions vary considerably within the two categories. Importantly, the co-operation with business life is strongly biased to a few universities in terms of corporate funding. For example:

- In 2014 the University of Tampere alone (one of the case study universities in this paper) gathered 57% of the total funding from foreign companies in Finland, mainly due to its vaccination-related research.
- Aalto University (technology-oriented) and Tampere University of Technology together collected about 45% of the total funding from domestic companies (about 10 m each).

1.5. Evaluation

The evaluation may be divided into the three main categories that aim to assist policy making. HEIs were evaluated by the Finnish Higher Education Evaluation Council (established in 1996 alongside the then Ministry of Education) until 2014, when the Ministry of Education and Culture appointed the *Higher Education Evaluation Committee* to conduct evaluations as part of the newly established *Finnish Education Evaluation Centre* (FINEEC). The Higher Education Evaluation Committee decides on project plans for the evaluation of HEIs, the composition of planning and review teams and the final results of the audits performed on the quality systems.

The Finnish Higher Education Evaluation Council was an independent body of specialists whose task was to assist higher education institutions and the Ministry of Education and Culture in evaluations of higher education institutions and thereby develop the quality of higher education with an emphasis on development-oriented evaluations instead of applying international rankings and related competition-oriented measures of evaluation. The Finnish Education Evaluation Centre (FINEEC) is an independent government agency responsible for the evaluation of education. It carries out evaluations related to education including the operations of education providers from early childhood education to higher education. FINEEC comprises an Evaluation Council, a Higher Education Evaluation Committee and units for the evaluation of general education, vocational education and training (VET) and higher education.

As indicated, co-operation with external parties is not particularly encouraged in evaluation or funding models. Instead, major incentives are based on performance in education (e.g. graduated students) and basic research (e.g. highly rated academic publications). Although there are attempts to

evaluate the employment of students in the future in the case of the universities in addition to the UASs, the incentives for the KT type of collaboration remain fairly modest or non-existent.

The second type of evaluation focuses on the performance and impact of major funding agencies. The *Academy of Finland* evaluates the Finnish research system, fields of science and its own research programmes. With the evaluations and by developing evaluation methods, the Academy strives to improve the quality and effectiveness of both Finnish research and its own activities.

The evaluation of *Tekes* also focuses on activities between business and academia as well as innovation more generally. It places considerable weight on university–industry collaboration and/or policy relevance in its funding decisions. Therefore, Tekes may be seen as the funding agency that most strongly supports the interaction between academia and industry and related policy formulations. However, the specific KT type of goals to link education and innovation are not included in the evaluations of Tekes as such.

The third type of evaluation focuses on innovation policy with the aim of renewing structures and courses of action. The effectiveness of innovation policy is the starting point for the evaluations, and they may be conducted by expert teams from Finland and or from abroad. Perhaps the most profound evaluation was conducted in 2009 (Evaluation of Finnish NIS, 2009) with a wide group of top experts from abroad. The fairly critical evaluation results did not, however, lead to many changes and a profound analysis at the policy level has not been produced since.

1.6 National innovation policy and regional economic development

Place-based innovation policies provide an important tool to support the development of KT activities. The wide geographical distribution of universities and UASs in Finland was significant policy action in the 1960s and enabled the introduction of several place-based or regionally oriented innovation policy programmes later on. Several innovation policy programmes and strategies from the 1990s onwards emphasized the collaboration of HEIs with their regional and local economies and societies. These include:

- Centre of Expertise I 1994–1998
- Centre of Expertise II 1999–2006
- Centre of Expertise III 2007–2013
- Open Innovation Environments 2008–2012
- Innovative Cities 2014–2017
- 6Cities Strategy 2015–2020

It is not appropriate to introduce all the programmes in more detail here. Instead, in the following case study, we will focus on the local case within the most recent national programme, labelled the *6Cities* programme. This programme and the related case study from Tampere capture the essence of the new approach well, taking the policy framework towards a more open and inclusive innovation strategy with strong links to local urban and economic development. However, the other contemporary major innovation policy programme, *Innovative Cities* (INKA), is also strongly embedded in the regional and urban development frame. To some extent the *6Cities* programme may be seen as a successor of the *Innovative Cities* programme; therefore, it is appropriate to describe the INKA programme briefly as well. The important difference between the Tekes-funded INKA and the ERDF-funded 6Cities programme is that the former aims to foster the *innovation activities of firms*, while the latter focuses on the *building of competences of cities and local public actors* to foster (open) innovation. Especially the 6Cities programme resembles the *"people" emphasis of the KT approach*, as users, citizens, entrepreneurs or students are strongly present in these policy measures, instead of only big companies and research institutions.

The INKA programme (2014–2017) still focuses on the development of "internationally attractive innovation clusters in Finland" based on high-quality knowledge and skills. The key actors in innovation clusters are companies that aim for growth with their innovative products and services targeted for the international market. The programme aims to build the competences of companies to increase their innovation capacity. It includes five themes, each led by one city: Bioeconomy, implementation **(**Joensuu), Cybersecurity **(**Jyväskylä), Future Health **(**Oulu), Smart City and Renewable Industry (Tampere) and Sustainable Energy Solutions **(**Vaasa).

The 6City strategy (2014–2020) – *Open and Smart Services* – is implemented by the six largest cities in Finland: Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu. In general terms it is a strategy for *sustainable urban development*, and the overall aim is to create new know-how, businesses and jobs in Finland. More innovation-related goals aim *to increase the amount of service innovations and to promote competitive business and employment*. The strategy is part of the implementation of Finland's structural fund programme for sustainable growth and jobs in 2014–2020 and therefore the overall theme resembles the goals of this programme as well.

However, the most relevant feature of the 6City strategy in terms of the KT and the open and inclusive innovation approach is its aim to strengthen Finland's competitiveness by using the country's *six largest cities as innovation development and experimentation environments in the spirit of open innovation*. The strategy is based on open "operating models that let the entire city community participate in development work". The functional city community is seen as an entity consisting of citizens, companies, research and development operators and authorities. The open operating model is based on the creation and testing of innovations while also increasing productivity (including the development of innovative procurement practices). The strategy assumes that cities as development environments also create international interest to interpret them as developing environments and a marketplace for business. The strategy is nationally significant, since the six cities account for one-third of the population and the vast majority of economic activities and jobs in Finland (www.sixcities.fi).

The three spearhead projects define the actual development activities in the programme.

1. The *open innovation platforms* are used to create and test new services and products in real-world conditions.
2. The *open data* from cities (e.g. traffic, buildings) serve as the raw material for developing new services and operations as well as businesses.
3. The *open participation and customership* aim to invite the entire city community to design and communally develop service innovations and customer processes.

Thus, the approach to innovation is strongly embedded in urban and socio-economic development and includes the development of innovative procurement practices and the provision of more efficient service structures within the cities. The principle steering the programme's activities is linked to this wider goal, as the programme aims to "promote employment and participation, especially among people with low employment prospects".

All the cities work together on three-year spearhead projects that provide the basis for the innovation activities and create the models for the co-operation to enable the city to work as a community. Additional pilot and trial projects may be launched annually with separate funding to support, test and develop further the contents of the spearhead projects. In addition, Tekes Finland has opened a supportive programme for companies to join the development programme and its activities. Thus, the programme is the joint operation of national agencies, six major cities and local actors implementing the project.

2 Knowledge triangle policies and practices in selected higher education institutions in the Tampere region

2.1 Case study: the 6Cities project and Tampere as a case in point

The definition of open innovation platforms (OIPs) should be developed to serve the innovation policy and the KT context. Currently, it is still evolving and seeking its role in innovation and regional economic development-related policies and practices. One goal of the 6Cities programme is to define, develop and test the OIP as a tool in this context. There are, of course, some existing, although still fuzzy and non-established, working definitions of the concept.

In the 6Cities strategy innovation platforms are seen as working environments that enable the development of new products, services and markets. On innovation platforms the whole city as a community and its various actors – like citizens, firms, research and educational institutions and public administration – can participate in the development processes and foster the creation of new services, solutions and businesses. Innovation platforms are tools that may foster the development of new services throughout their lifespan from idea to testing and from testing to ready-made products. The approach is user driven and encourages short and agile experiments in innovation activities. It should also support cities as they develop their innovative procurement practices by engaging citizens, experts and other relevant stakeholders to provide better services and enable business development around the new services (6Cities Strategy Office, 2016).

From these fairly generic premises, we will discuss the real-life implementation of these goals in the case of Tampere, and we will focus on those three cases that especially aim to build innovation platforms according to the KT approach, that is, around education, research and innovation in the HEI context. In addition, selected approaches from other cities will be discussed briefly to highlight the wider interpretation of the open innovation platform approach. Innovation platforms offer the KT (or triple/quadruple helix) a broader view of how to foster the processes whereby the knowledge base of the whole city and its various communities are harnessed to provide better services and solutions in urban and societal development in general through more participatory or inclusive models, moving beyond the HEI and business development approaches.

Tampere as a case in point provides a description of the state of affairs and the most recent policy developments in OIPs and HEIs in Tampere. Short case study descriptions of each institutional set-up are provided. Data are collected as part of the 6Cities ERDF-funded project (2015–2018). The case study aims to provide insights especially into the **three cases of innovation platforms** in the Tampere region, fostering the KT strategy in the HEI context, and the **emergence of regional/local networks** among these and other OIPs in the region. The short discussion also includes the role of the **national strategy** emerging bottom-up from local practices and from the co-operation of the six biggest cities in the implementation of the national strategy (6Cities). It is important to acknowledge that the influence and impact of the OIP approach are likely to depend on these activities fostering the systemic change – the formation of networks and national strategies.

- The data from informants include 37 meetings/interviews (conducted by April 2016) with policy makers, developers and other stakeholders.
- The data from documents include reports and evaluations, reports of universities, strategy documents and project plans that are available to the case study team.
- Action research method: the team is part of the open innovation platforms project (6Cities) (ERDF) that currently provides both practical development plans and material for academic research. The further study is work-in-progress.

All the cases include HEIs that have strategic plans and ambitions for strengthening the links between education, research and innovation or the “third mission” of their institution. The cases explicitly focus on the practices and explain how HEIs and other actors have worked to realize these

ambitions. To some extent it is also possible to interpret the results that they have achieved, but only some of the institutions have worked in the context of OIPs for long enough to see some fruits of their labour, while many of the activities are still emerging.

2.2 Tampere as an innovative region

First, it is appropriate to describe the city of Tampere as an environment for the KT and OIPs. The city of Tampere has 225 000 inhabitants, and as a city region that represents a more functional region including 10 municipalities there are 364 000 inhabitants. The wider administrative Tampere region has 500 000 inhabitants. The region is very centrally located in Southwestern Finland and, together with the capital city region of Helsinki, forms the most dynamic regional economic zone in the country. Tampere is also the second-most-important node of education, research and development in Finland and in many ways a forerunner in policies of knowledge-based development. There is a long history of industrialization and innovation policies in the region.

The industrial history of Tampere was to reach its summit in the 1960s, with a total of 37 000 employees in manufacturing. After 1962 employment in manufacturing entered a slow decline due to internationalization, automation, rationalization, outsourcing and other factors. During the 1960s the growth coalition managed to lure two universities to relocate from Helsinki to Tampere. The first was the University of Tampere, with its forte being research and education in society and health; soon after this the UTA established the first chair in computer sciences in the Nordic countries. The UTA was quickly followed by a small unit that would become the Tampere University of Technology, soon to be recognized as the "university of industry". These two were later supplemented by the Tampere University of Applied Science, which provides the local labour markets with practically oriented professionals. In the 1970s the manifold processes and impacts of globalization and the knowledge economy began to have an effect. It was commonly agreed in the city that the university was an institution of the future and therefore a strategic priority.

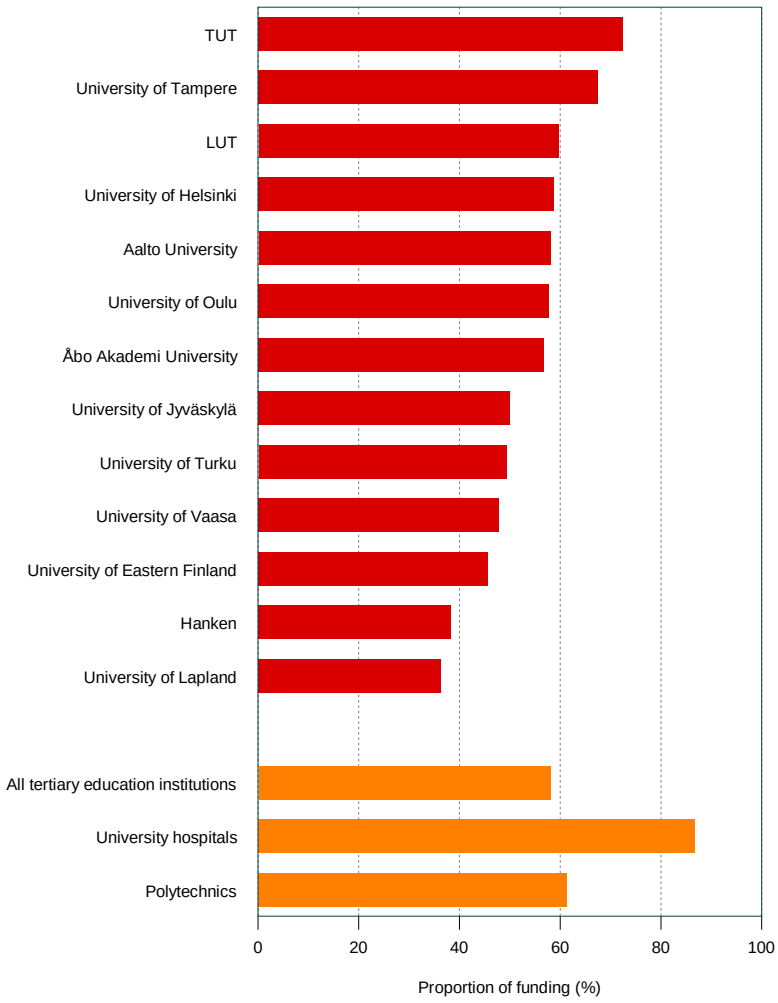
During the following decades, industry learned to collaborate with all of them in an intensive and versatile way. Regarding their large share of external funding for R&D (65–70%), both the scientific universities are at the top nationally (see below) as a result of intense collaboration with industry and successes in bidding competitions and unarguably reflects their strong participation in the generation of new knowledge that benefits society. The universities have greatly helped to create a "local buzz" as well as the much-needed "global pipelines" that have fed the local innovation environment with a continuous stream of fresh ideas and knowledge.

At the beginning of the 1990s, Finland plunged into a deep recession, and this certainly hit Tampere hard too. For some years one-fifth of the workforce was unemployed. The measures taken by the public and private sectors from the mid-1990s were large and influential and indeed managed to guide the country and the region to a new growth trajectory largely based on knowledge-intensive businesses and activities. In retrospect, it seems that the recession sped up the development of the knowledge economy.

To be concrete, the transformation into the knowledge economy during the past 50 years can best be described by the following key indicators for 1960 and 2010 (c.f. Kautonen, 2012): jobs in manufacturing industries decreased from 37 000 to 27 000, while the same amount of jobs was created in R&D as the number grew from a few hundred to 10 000. Furthermore, the jobs in knowledge-intensive business services grew from 500 to 18 500 and HEI students from 0 to 37 000 due to the three HEIs established to Tampere.

For many years R&D expenditure has represented approximately 15% of the national total (more than 900 million euros annually). This is more than 2 000 euros per inhabitant from 2006 until recently; thus, Tampere has represented the national top level in R&D intensity. Of the gross regional product, R&D has accounted for about 7%. Parallel figures are seldom seen among European cities.

Proportion of outside funding by tertiary education institution, 2013



TUT = Tampere University of Technology
LUT = Lappeenranta University of Technology
Hanken = Swedish School of Economics

Source: Statistics Finland

For the past two decades, 150–300 patent applications have been filed annually in Tampere. It is particularly important that these applications are distributed evenly across different patent categories, indicating that diversified knowledge bases exist within the city and enabling combinations of competences and manifold interfaces that are fruitful for innovation.

In the current decade, every fifth inhabitant of Tampere is a student in a higher education institution and every third inhabitant over 15 years of age has a degree from a higher education institution. Out of almost 10 000 R&D workers in 2010, more than half were employed by the private sector. The most recent structural changes have changed the situation due to lay-offs from big high-tech companies, but the overall situation is still based on a clearly stronger knowledge-based local economy than average when compared with similar-sized city regions around Europe. However, the most recent structural changes have been significant, and it is likely that they are not yet fully reflected in the numbers provided above.

2.3 Knowledge bases and clusters in Tampere

There are **three key clusters** built on strong competences and three industrial agglomerations based on these strengths locally: a wide-ranging ICT cluster, a versatile life sciences cluster and an intelligent machinery cluster, representing the successful transformation of the traditional mechanical engineering industry. These clusters are also potential users and developers of OIPs, as it is not likely that fundamentally new knowledge bases will emerge in the region.

ICT cluster: In a city with 200 000 inhabitants, the cluster employed more than 6 000 engineers until 2015, but recent turbulence in the ICT industry has made the situation less clear. A key long-term strength of the cluster is its wide-ranging spectrum of industries, application domains and product competences. The cluster covers three key areas: mobile handsets and embedded devices; telecommunication networks; and Internet and cloud services. The recent structural changes have taken place especially in the field of mobile handsets.

Nokia Group has transformed recently to focus on telecommunication equipment and related fields, and Tampere has not been immune to these. Nokia's former mobile phone R&D activities in Tampere have become part of Microsoft; consequently, Microsoft emerged in 2014 as a new player within the city, initially with 1 150 employees in R&D but laying off significant numbers of its employees in Tampere during 2015. Nokia will remain important in its historical place of birth, retaining almost 800 R&D specialists in telecommunications, digital mapping and location applications and services and long-term research and IPR portfolio management. The special severance payments and start-up support for those leaving Microsoft, however, may offer important input into local business and technology communities, according to their previous experience.

In addition to Microsoft, in recent years numerous other international companies have come to Tampere. Besides these large ICT multinationals, there is a fast-growing cohort of start-ups and knowledge-intensive firms. The further evolution is constant at the moment.

Life sciences cluster: The city has a combination of multidisciplinary, technological, biomedical and medical expertise in the education, research, healthcare and business sectors. In recent years the health, wellness and biotechnology sector in the city has been the fastest growing in Finland and received the largest number of private investments in business development. Tampere is, indeed, globally at the forefront of research and product development for biomaterials and tissue technology, and the research carried out has given birth to several companies based in the city that operate in the global market.

Intelligent machines: These represent the traditionally strong technology cluster in Tampere and its immediate vicinity, with more than 1 000 companies that account for the added turnover of more than 7 000 million euros (2011) and employ more than 34 000 people. The R&D investments account for more than 750 million euros annually, which demonstrates the seriousness with which the leading knowledge-intensive companies take sustaining their innovativeness.

Ten world market leaders operate in Tampere, forming the backbone of the cluster. These include AGCO Power (a global leader in diesel engine technology); Bronto Skylift (a global market leader in truck-mounted hydraulic platforms); Fastems (a globally leading supplier of automation to the mechanical engineering industry), John Deere (a global market leader in design, manufacture and distribution of forest machines); Cargotec (a global market leader in cargo and load handling solutions); Metso Automation (a market leader in process automation solutions for the pulp and paper industry); and Sandvik (which globally offers the widest range of equipment for rock drilling, rock excavation, processing, demolition and bulk-material handling).

Importantly, many of these have invested in the city very recently, indicating that, despite their global expansion and offshoring activities, those companies are convinced of Tampere's importance, especially as an innovation environment. For example, the world's largest production automation and

testing site for container terminals is located in Tampere: Cargotec Group invested approximately 35 million euros in its new technology centre in 2012.

The recent structural changes have left many highly skilled people unemployed, especially in the field of ICT. However, a significant number of these professionals have been employed by their own companies or new companies in the region. Still, the amount of unemployed highly skilled professionals is an unseen situation in the region and is posing some challenges as well as offering some opportunities to develop a new innovation ecosystem and activities with the new companies.

In addition, the **media** have been a strategic field that Tampere has been emphasizing in its development programmes, mainly due to the future potential that the location of the national broadcasting company has provided for the region rather than the actual significant size of the cluster as such.

2.4. Knowledge-based development policy in the Tampere region

A knowledge-based development policy in the Tampere region supporting the emergence of KT activities has been followed during the past decades. This includes the construction of a basic innovation infrastructure, such as universities and their mechanisms for technology transfer, science parks, programmes of centres of expertise and clustering, and so forth.

Collaboration between the universities and the business sector has for a long time been both intensive and a natural part of daily activities. According to *Smart Europe Assessment* (Tampere Project, 2013): "There is a unique co-creative and collaborative atmosphere between universities and businesses". Without delving into the lengthy list of actors, it is worthwhile characterizing some of the key actors that form the backbone of the local innovation environment.

Tampere has been the forerunner of large, locally initiated public–private partnership-based innovation programmes. These have generated cumulative competences and the confidence to conduct large-scale innovation policy operations with high impacts (see e.g. the final evaluation of the National Centre of Expertise Program).

The latter part of the 1990s saw the emergence of a cluster-based innovation policy that bore fruit first as an enabler of rapid growth in the ICT cluster and then, on both sides of the millennium, as large innovation programmes (eTampere, BioNext, Creative Tampere) and their impacts on local entrepreneurialism and many innovative outcomes. Nevertheless, the programmes then were characterized to some extent by a supply-driven logic.

Somewhere between 2005 and 2008 it was realized, both in Tampere and nationally, that a more demand-driven approach should be taken. This is, for example, to exploit the potential hidden in a large public sector (innovative procurement), in a highly educated population (democratization of innovation) and in more active IPR management (open innovation) of companies and higher education institutions, for example. A roadmap to smart specialization in the Tampere region starting from the regional cluster policy programmes in 1994 may be listed as follows:

- Tampere Centre of Expertise I 1994–1998
- Tampere Centre of Expertise II 1999–2006
- eTampere 2001–2005
- BioNext 2003–2010
- Creative Tampere 2006–2011
- Tampere Centre of Expertise III 2007–2013
- Open Innovation Environments 2008–2012
- Open Tampere 2012–2019
- Innovative Cities 2014–2017
- 6Cities Strategy 2015–2020

Most recently, the open innovation platforms have identified a tool with significant potential to implement the goals of the strategies based on open innovation and the "smart city framework". It should be noticed that OIPs have also been used in the regional management of structural changes, as they have offered services to activate and foster the entrepreneurial potential of highly skilled people who are unemployed or in danger of becoming unemployed due to structural changes. They have already been part of the process, as professionals leaving the big companies have been supported in their career transformation, especially towards entrepreneurship.

2.5 HEIs in Tampere

The *University of Tampere* (UTA), with its 16 000 students, focuses on society and health. Its leading fields of research include, for example, information, information technology and knowledge; cities, the environment and the regions; journalism and media; changes of society; and the individual and the health of the population. Centre of Excellence in Research status has been conferred by the Academy of Finland on Research on Mitochondrial Disease and Ageing and the Finnish Centre of Excellence in Historical Research. It is the top university nationally in terms of external funding from foreign private companies. The university is very popular among potential students but the most difficult to gain admittance to; only one in ten applicants is approved annually.

Tampere University of Technology (TUT), with its 10 400 students, has a reputation as an industrial university due to its long-lasting close collaboration with industrial companies. The leading fields of research are especially signal processing, optics and photonics, intelligent machines, biomodelling and the built environment. The Academy of Finland has appointed the Signal Processing Algorithm Research Group (SPAG) and Generic Intelligent Machines (GIM), together with Helsinki University of Technology, as Centres of Excellence in Research.

Tampere University of Applied Sciences (TUAS), with almost 10 000 students, supplements this knowledge infrastructure with its versatile supply of graduates in, for example, computer science, media and graphics, digital gaming and many other fields.

In addition, the large R&D facilities of the Technical Research Centre of Finland VTT (with more than 300 experts) provide the companies with an R&D partner especially in those three areas of competence that are at the core of strong local clusters.

The integration of research, innovation and education may be found in the *strategies* of all three institutions in Tampere. However, the "third mission" and especially links to industry and business are much more explicitly formulated in the strategies of the Tampere University of Technology (TUT) and the Tampere University of Applied Sciences (TUAS) than the University of Tampere (UTA), which is more oriented towards social sciences and medicine. Importantly, *three HEIs have started a merger process and aim is that there is only one university in Tampere 2018* including the three existing institutions with more than 40 000 students.

The vision of the University of Tampere (UTA) declares that: "By 2020, the University of Tampere will have a strengthened profile as an international research university and be a significant generator of new, *world-changing knowledge*". It refers to universities as creators of new knowledge upon which to base sustainable and ethical decision making. The UTA's "promise" in strategy is that it is committed to multidisciplinary and high-quality research with a *social impact*. The further strategy states: "While new knowledge is founded on independent research and the free exchange of ideas and cooperation, it is also based on the will to solve problems and pursue new opportunities. Consequently, research and education are not defined by science alone, but also by reality as it is experienced" (UTA Strategy for 2016–2020).

Table 2. Profiles of the higher education institutions in Tampere

HEIs in TAMPERE:	University of Tampere (UTA)	Tampere University of Technology (TUT)	Tampere University of Applied Sciences (TUAS)
Students, 2014	14952	8390	10290
Bachelors and masters	12090	7336	9495
Post-graduate	1811	1054	
Other	1051		795
Teaching and research personnel, 2014	1068	1118	421.4
Foreign students, 2013	535	797	293
Degrees/graduates, 2014	2571	1598	1856
Bachelor and masters	2289	1499	1856
Post-graduate	154	99	
Other	128		
HEI spin-offs, 2014	..	3	2
Basic budget funding, M€, 2014	116.3	82.0	65.3
Domestic private funding, M€, 2014	6.0	15.3	2.8
Foreign private funding, M€, 2014	8.3		0.2
EU and other int'l funding, M€, 2014	6.3	5.3	1.5
External research funding (universities), M€, 2014	41.9	50.0	
Finland Distinguished professors (Fidipro-program) and foreign researchers, 2014	100	264	1

The KT elements are more explicit in the strategy of Tampere University of Technology (TUT**),** as it declares its mission to be "the leading edge of technological development and a sought-after collaboration partner among the scientific and *business communities*". In its vision it promises to "foster the well-being of people and the environment through research and education and to develop technologies that reshape the competitive landscape of Finnish industry". Further, the TUT breaks down its vision into tasks in research, education and societal impact. In research the "strengths lie in the interaction between fundamental and applied research", and in education the "students learn to understand the importance of technology in addressing the challenges of sustainable development and have the opportunity to develop their entrepreneurial skills". In terms of societal impact, the link with industry is strongly emphasized:

> "We generate new knowledge and expertise for the benefit of society. Our University is a sought-after partner for research and development projects conducted in collaboration with business and industry and a fertile breeding ground for innovations and new research- and knowledge-based companies."

The TUT also lists its "success factors", which include the "close collaboration with companies as it motivates TUT to apply scientific knowledge to real-life problems" and "students with a first-rate learning environment, excellent facilities for extracurricular activities, with support to join creative projects related to their studies". Additionally, the support for the commercialization of research results and the establishment of new companies are listed as success factors (TUT Strategy for 2016–2020).

Both the UTA and the TUT also mention that the goals will be facilitated by the new university in Tampere, a merger of the city's three higher education institutions. Furthermore, the Tampere University of Applied Sciences (TUAS) clearly links its role to RDI activities by declaring in its Visio 2020 that "As a working-life HEI we ensure the best possible learning opportunities for our students and we participate in the research, development and innovation activities that renew and serve the working life" (TUAS Vision 2020).

Although all three HEIs have boards with external members to form strong links with institutions in relevant fields of the society, their strategies suggest (as well as their sources of funding) that the strength and focus of these links vary widely. At the very practical level, in human resource policies there are parallel differences between the HEIs; the TUAS requires three years of work-life experience from its teachers, and in the TUT and UTA more academic credentials are emphasized. However, mobility between the industry and the TUT has been very high from the 1990s onwards.

2.6 Knowledge triangle and three OIPs as a case in point

In the case in point we argue that clusters and regional or national innovation networks have evolved towards the OIP approach in the Tampere region. The case in point encompasses research, education and innovation as well as entrepreneurial aspects of OIPs. OIPs in this case study frequently bring together multiple HEIs and other stakeholders and thus provide examples of partnerships with private and/or public partners at the institutional level. The study also covers the national 6Cities policy programme and provides some examples from other cities to illustrate the variety of approaches that are applied in the OIP context, but the main focus is on Tampere and three OIPs. The OIPs are selected to accommodate the diversity in types of higher education institutions as well as to represent different relations with knowledge bases:

- The **Demola** case illustrates the OIP serving a *large coalition of universities*, as it accommodates students from all three HEIs of the region and occasionally students from the other universities outside the region as well. It also clearly supports the idea of related variety, as the student teams in Demola are always multi-disciplinary.
- The **Mediapolis** case focuses on an institution with a strong *regional profile*, as the Tampere University of Applied Sciences (polytechnic) is a key HEI. It is based on the idea of strengthening a fairly weak knowledge base (symbolic), as there is no strong media cluster in Tampere yet. To some extent it also supports related variety by bringing the different knowledge bases of media (symbolic) and ICT (synthetic) together.
- The **Campus Arena** is located on the campus of the *technical university* and builds on perhaps the strongest knowledge base (synthetic) and clusters (ICT and machinery) in Tampere.

The emerging network of open innovation platforms is discussed, since the building of an innovation environment is a systemic challenge in the region rather than only an organizational one. Further, OIPs have links to wider urban development (e.g. citizen participation, innovative procurement), the provision of public services (e.g. digital platforms, open data) and business development practices beyond the KT, so these issues are briefly covered after the cases to illustrate the fundamentally systemic nature of the issue.

The national 6Cites programme's OIP spearhead projects have heavily used the experiences from the work undertaken in Tampere with OIPs and in the New Factory (est. 2008) especially. The 6Cities strategy in Tampere is implemented by teams from the City of Tampere, the Tredea Development Agency, the University of Tampere and Tampere Regional Council as a joint effort.

Despite the systemic and broad connections of the OIP approach, it also has several locally important qualities specifically from the KT point of view in the case of Tampere.

- In OIPs the role of students as innovators is stronger than in more traditional cluster projects; the link between learning and education and innovation is often very real and direct.
- All three HEIs of the region are aiming to integrate and establish only one university in the region (the Tampere3 process). The HEIs are committed to the process and OIPs offer both a potential shared mode of civic engagement and an educational tool, both of which are likely to be highly relevant in the immediate future as measures for HEIs and for the success of integration.
- As a new form of civic engagement and university–industry collaboration, the OIPs as part of the regional innovation ecosystem offering innovative trials and a testing environment for firms and other organizations provide a stronger role for the new university in the region and maybe even globally.

It should be noticed that there are several practices that support entrepreneurship and innovation initiatives in the Tampere region with links to research and education (e.g. research parks, incubators, TTO initiatives to promote student entrepreneurship, entrepreneurship training; see e.g. Box 1). However, this study is limited to the OIPs that represent the novel and broad approach to the matter.

Box 1. TAMK/TUAS Pro-Academy

The **TUAS** provides **Proakatemia (Pro-academy)**, which was established in 1999 and is a target programme to educate entrepreneurs and team leaders. Pro-academy is very practically oriented towards entrepreneurship and avoids traditional lecturing in its education. Students aim to set up real companies in teams, "team companies", with a coach who fosters the learning throughout the studies. For example, in 2014 the turnover of "team companies" was 600 000 euros. After graduation 37% of students end up as entrepreneurs.

The available studies include the *start-up entrepreneurship course* (60 credits) that it is possible to attend while developing one's own business. The course includes elements of business development in practice. By completing the course, the student is entitled to conduct the whole study programme in the TAMK. In 2012 the Y-campus was set up as the head campus of the TAMK to be a "headquarters of entrepreneurship" to encourage students from different disciplines to become involved. In Y-campus events, information sharing, courses and coaching take place to enhance entrepreneurship. In addition, a mentoring network of entrepreneurs is organized around the Y-campus. These programmes are programmes for students and are clearly targeted to those who aim to work as entrepreneurs. The other form is start-up programmes that support selected early-stage companies with growth expectations.

Table 3 Case studies in a nutshell

Case study:	**New Factory/DEMO LA (2008)**	**MEDIAPOLIS (2014)**	**CAMPUS ARENA (2015)**
Case study context:	Most advanced innovation platform activity **"Demola"** within the joint co-creation space of three universities ("New Factory/Finlayson Campus")	**Joint campus** for the media programme of the University of Applied Sciences and Vocational College and business activities of 30+ companies and their **innovation platform-related solutions**	**Campus Arena** building complex as a state-of-the-art learning campus environment and its **innovation platform-related tools** (e.g. Campus Club, Demola) to foster KT practices
Key platform activity in focus:	Co-creation projects of students and companies (Demola)	Specific platform-related activities for the media field (e.g. IPR-VC, co-productions among firms and students)	Campus Club is the main co-creation tool developed in close co-operation with industry for companies in Campus Arena.
Owners of the platform:	Hermia group (*development agency owned by the City of Tampere, VTT and the University of Technology*)	Technopolis Ltd. (*with anchor tenants:* *Finnish Broadcasting Company/YLE, Tampere University of Applied Sciences/TAMK and Tampere Vocational College/Tredu*).	University of Technology and University Properties of Finland Ltd
Main HEIs involved and location:	All three universities of the region in a shared extra-campus city centre location (co-creation space)	University of Applied Sciences in a new joint campus with industry (Mediapolis)	University of Technology, new building in the centre of its campus
Placed-based policy driver:	**Digitalization** and need for the new agile (platform-based) modes for university–industry collaboration	Fostering the development of a media cluster in the "second-city" environment as the industry undergoes profound **structural and technological changes**	**Structural changes in the ICT** field and renewing of university–industry collaboration
International/ local dimensions	Companies in the region are the main users, but the international Demola network has extended to several locations abroad, and of the students in teams 60% are international	Locally strong educational institutions and key firms are committed to the development of local industry, but key companies have significant international partnerships and the aim is to attract more	Companies involved are very international e.g. the Regus business hotel provides a network of global co-working space for its clients
Key sector	Digital technology	Media and content	ICT and engineering
Volume examples*	**2014 Demola**: 66 projects, 283 students, 45 companies, €280k in licenses	**2015 Mediapolis campus**: 500 employees, 500 students, ca. 30 companies in Mediapolis	**2015 in Campus Arena**: 30 firms in Campus Club (500+ m^2), office space (1500+ m^2), space in total 10 000+ m^2

* At one point of time, i.e. they may change a lot over time

2.6.1 New Factory – Demola and "OIP laboratory"

Demola is one of the services of the New Factory started in 2008. The New Factory is a combination of services that originally consisted of four "engine rooms" (*Demola*, *Protomo*, *Suuntaamo* and *Accelerator*) that had their own functions but worked towards the same goal of creating new businesses through and from open innovation processes.

- Demola was, and still is, an environment in which to generate prototypes and demonstrations from ideas typically coming from private firms, developed in projects by multidisciplinary student teams.
- Protomo functioned in a somewhat similar way, but instead of students as its "workers", it engaged self-employed entrepreneurs and experts often in a phase of career transition. The Protomo concept has evolved towards a "start-up programme".
- Accelerator provided new businesses with various business service resources and competencies, including help to find matching venture capital. Currently its activity is rather an incubator than an accelerator.
- Suuntaamo was a kind of open test laboratory for new products and processes and was developed after the other three engines. Suuntaamo has set up a private business model and moved away from the New Factory.

Common to each engine was an attempt to operate on principles characterized as "customer focused, down-to-earth, agile, cost-efficient and effective". These evolving forms within the platform illustrate the dynamic structures in which services develop along with the demand and may disappear or turn into private services, depending on the demand. So far, the most long-standing and visible engine of the New Factory is Demola. The essential characteristics of the New Factory are openness and the many community-like features that make it stand out from traditional innovation environments. Due to its success, strong link to the KT and long-term performance, this case study focuses on Demola.

Behind Demola (and the New Factory), there are several key actors of the regional innovation policy, including Hermia Ltd (a semi-public local innovation agency) and the three HEIs located in the city. In terms of the KT, it is important that the active change agent has been not the university but the regional development agency (owned by the University of Technology) and industry, which has fostered the university–industry collaboration or even "civic engagement" in practice. There is a clear lack of incentives for the universities to foster civic engagement in government policy, which may partly explain the situation. A typical collaboration scenario in Demola is the following:

- A firm that has a concept or idea that is subject to high levels of uncertainty decides to outsource the development process to Demola to produce a prototype or demonstration through further development and testing;
- The concept is evaluated and formalized into a project design by Demola;
- A multidisciplinary student team is built around the concept, gathering student candidates from the universities and polytechnics, and a project contract is signed by the stakeholders (the firm and the team), including issues related to IPRs and the timetable;
- The concept development starts, lasting 3–4 months, with sparring and support by Demola and the firm and including concept or prototype testing conducted with the users; and
- Demonstration of the concept or prototype is carried out by the student team, followed by the project evaluation and the finalization of license agreements.

The benefits of Demola are not limited to a single firm, since the student team also has a chance to utilize the immaterial assets created by setting up a start-up company in a case in which a firm does not acquire a license for the IPRs. Students may also be recognized for their talent, leading to employment. All the IPRs generated during the project belong to the student team. At the end of the project, the partner firm can acquire a license for the results and reward the students for their work according to the performance criteria agreed earlier. The method is notably effective, due to the well-

defined IPR framework (which avoids the contractual costs of collaboration), the focus on the concepts pre-selected by firms and the diverse set of skills and ideas of the students working on it.

The scalable, platform type of process is well established in Demola. It may conduct several student projects through the same procedure, and Demola itself facilitates the process by providing the shape, contacts and contracts for the student team and the company or other organization providing the assignment. For example, in 2014 Demola had three "seasons" for students and companies to apply. There were

- 45 companies giving the assignments,
- 283 students participating in the projects (of whom 62% were international students)
- 66 Demola projects by student teams
- 71% of the licensing rate from the outcomes of the projects
- 280 000 euros of rewards in licenses

The international Demola network started to grow in 2010 and have now spread to ten locations, including several European cities but also beyond, including Namibia and Mexico. This opens up new possibilities to link the platforms to local innovation ecosystems globally and for example run demo projects in two or more locations simultaneously to develop the qualities of the product in different environments. Furthermore, Demola International is "exiting" from the New Factory, as it is organizationally a private company, although it is functionally part of Demola Tampere. Again, evolution on the platform is an important part of its development (e.g. Raunio & Kautonen 2014), and platform management capabilities are also required to renew its operations financially beyond the public project funding, as the case of internationalization indicates.

The KT approach is evident in the case of Demola, as it directly links the innovation activities of firms and other organizations with student teams and enables them to benefit from their work in the form of licensing. On the other hand, firms directly benefit from the demo that the project delivers to them after the project. Student credit points are also provided by the participating HEIs, with varying practices in different schools, but the opportunity is always offered to the students. Importantly, the demo projects are conducted by students from the three different HEIs, with wide disciplinary backgrounds, and from polytechnics, the University of Technology and social sciences. In other words, the teams as such cross several lines that normally restrict the interaction in knowledge creation and use. As a platform service, Demola may be interpreted as a one form of transaction platform (Evans and Gawer, 2016) that connects two groups of users – universities or student teams and local firms and other organizations – to benefit mutually from open innovation projects.

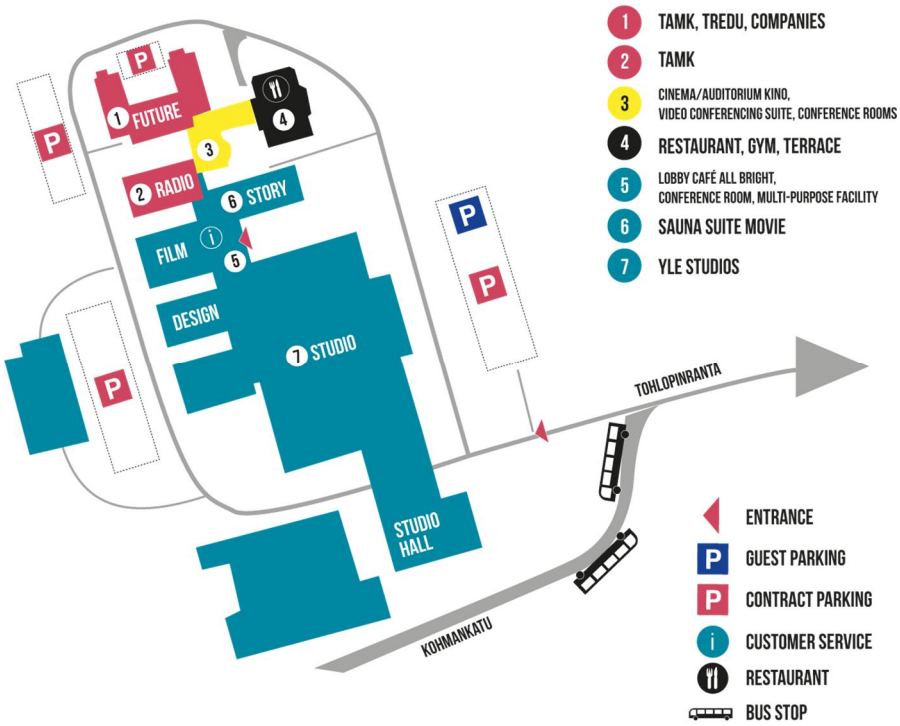
2.6.2 Mediapolis – centre for storytelling and digital business

Mediapolis is a new centre and network for digital business and storytelling, or content producing, and provides related services for its clients. Mediapolis gathers together a community of over 700 employees and 600 students in Tampere in a renewed campus built around the old studio complex of the national television Channel 2 (Figure 5). The campus has some room for further development in terms of new premises. In physical terms, Mediapolis, like the New Factory, is a whole new campus area outside the established university campuses. Again, the initiative came from the business side rather than from the HEIs themselves.

The Mediapolis concept offers a framework for the development of an internationally recognized centre of excellence and business in the field of media. Its distinct characteristics are built on the new kinds of services and practices that work as a "collider" between ICT and creative industries. The motivation to set up a new centre is based on the attempt to strengthen the media business in the Tampere region, as it is increasingly concentrating on the capital city region, where the vast majority of media business already operates. One of the key changes that enabled the development of the new

service concepts was the organizational restructuring of the national broadcasting company (YLE) and their plans to move activities from the Tampere studio complex to the capital city. The new owner of the studio complex, the private business premise developer and service provider *Technopolis*, is also committed to putting some extra effort into fostering business development in the centre.

Figure 5. Mediapolis campus map (www.mediapolis.fi)



The idea of Mediapolis was initiated in 2011 when the national broadcasting company YLE was seeking more co-operation with its partners to support the vitality of the creative business in the region. It also sought cost-efficiency by sharing the premises with other actors and focusing its own core business in the creative industry. Therefore, in 2012 the YLE sold the studio complex to Technopolis, of which the core business is the management of business premises. Due to this transaction one-third of the office space became available for renting out to other businesses and actors in the media field. Technopolis then renovated the premises to fit the purposes of multiple tenants better. The YLE and the University of Applied Sciences of Tampere (TAMK) made 20-year contracts with Technopolis, other firms and actors were able to move into the campus in 2013 and finally in 2014 students of arts and media (TAMK), media assistant students from vocational training school (Tredu) and the first firms moved onto the campus. The challenges that Mediapolis aimed to solve are structural changes in the media field and the related goal of building up a significant media business in Tampere.

The biggest actors on the campus are the YLE, TAMK and Tredu. There are also more than 30 media, ICT and expert service companies on the campus. The biggest group of companies consists of producers, the largest of which is the internationally operating and fast-growing Aito Media Oy, which is one of the biggest companies in the field in Finland. It has for example TV productions based on the most popular series in Finnish TV, which employs around 100 professionals. The content for the series is provided by the YLE.

For students the campus offers the opportunity to benefit from the audio-visual devices and studios of the YLE and Aito Media, on top of the own devices of their educational institutions, as well as other kinds of co-operation opportunities with the companies. For example, services that were previously available only to the YLE are now open to other actors, including the studio premises, design services, props and wardrobes.

The vision and strategy of Mediapolis in terms of innovation platform are still evolving, but they have been developed from the beginning. The project received funding from the European Regional Development Fund (EAKR) and already provided a contract for mutual trust to cope with IPRs in the early phase of the innovation projects. The platform types of activities were also developed in the early phase along with the *MediciLab* concept. It was shared physical space (200 m^2) for different actors in the media field. The goal of the MediciLab was to provide multidisciplinary innovations through storytelling, colliding and transmedia. In addition to the co-creation lab, open-source TV, professional events and media-based demo workshops have been on the list of potential tools to proceed further. The concept of MediciLab struggled to find a suitable funding model, although the key actors of Mediapolis agreed that there is a need for a co-creation platform.

The leadership in both new types of media combination, as well as the small size of many firms in the field, has been a challenge. One solution to these problems has been tighter co-operation among the actors by establishing one co-operative among the small companies and another co-operative among the big players of Mediapolis. The co-operative of small firms may foster its members' business and organize the joint marketing and communication efforts for Mediapolis, while each individual organization of course takes care of its own marketing. It should be noticed that in the media business, even without the co-operative, especially small companies engage in co-productions, which are a common mode of operation in the media field. A co-operative was established in 2015 among the key actors, which may help to set and achieve the common strategic goals of Mediapolis.

Students are also an important resource for the companies in Mediapolis, and assignments and theses offer tools to link students to business. During the ERDF project, some Demola projects (see the case above) were also conducted in Mediapolis, and the even more stable Demola location was planned to be part of the service offering on the campus, which, however, was not implemented. A total of 20% of the students of TAMK's media plan to be an entrepreneur, so it is feasible to support these opportunities in Mediapolis. Importantly, Mediapolis hosts not only HEIs (University of Applied Sciences) but also students in vocational training (Tredu) and thus moves even further towards support for practical and experience-based learning and innovation. This is well in line with the visible feature of the centre in terms of its civic engagement and links to the urban development goals of the surrounding area.

Companies and educational institutions have co-produced the Medici-lab type of "Lintukoto" production, which is a trans-media storytelling project that was initiated from very open starting points, and the first thing that the participants agreed was a deadline. The project cross-fertilizes different media and research fields and aims to provide new applications. Co-operation takes place between the University of Tampere, the Tampere University of Technology, the TAMK, the vocational training school (Tredu), Microsoft, Apex Games, Odion, Start Track and the YLE. The project aims to develop new forms of storytelling, in which a player is an active participant in the game and experiences the game as such. This was the first project that applied the "confidentiality agreement" created in the ERDF project for the use of Mediapolis projects. This means that each actor maintains his or her IPR on everything that he or she provided for the project. The project's outcomes will be applied in other platform projects (Demola), and it provides some useful material that may be used in the local Tesoma urban development project.

Mediapolis is also linked to urban development in the neighbourhood of Tesoma, which is considered to be one of the most challenging areas in Tampere due to several social problems that have agglomerated there. The civic engagement practices are related to the "media theme bus" which is applied to one of the routes driving to Tesoma, and a reality TV series focusing on the neighbourhood.

While the elements of the KT are fairly easy to find in different practices, the characteristics of OIPs, especially a scalable and open innovation process, are still evolving rather than being well defined. New openings, like setting up an IPR VC fund, which is the first of its kind for creative industries, however, exist and perhaps build OIPs in a more step-by-step manner than in the case of the New Factory, also due to different logics of the business environment and its working culture. However, finding an agile and easily conceptualized OIP model that adds something new to media-related demo workshops that Demola, for example, could also organize is a well-recognized challenge.

While the basic element in terms of the KT approach is the combination of students and companies in the media business on one campus, the crucial issue in terms of OIPs is how to organize the mutually beneficial co-operation among the users of the platform. The easy option has been the use of Demola in this context as well, but to deploy the platform service model more efficiently, the more detailed and visible services are under development to increase the open innovation activities among the various groups of Mediapolis. The ultimate goal is to increase the flow of innovations from the campus to the industry but also carefully to design the benefits that other platform users gain from the process.

2.6.3. Campus Arena

The campus of Tampere University of Technology (TUT) accommodates about 9200 students and 1800 members of personnel. On the campus or in its immediate vicinity are also located the Hermia Technology Centre (offering business development services), Finnish Technology Research Centre (VTT) and numerous high-tech companies.

The *Campus Arena* is a very recognizable new building within the TUT campus, and it accommodates some of the basic services of the university (e.g. the library), but its profile is strongly built on the new kind of university–industry collaboration activities that resemble well the ideas of the KT approach. It is marketed as a "meeting place for science, research and technology". Compared with the Demola or Mediapolis examples above, the Campus Arena is more clearly part of one institution (TUT), as it is located in the central place on the campus and is a new landmark of the TUT. It was opened in September 2015; consequently, during the course of the study at hand, many of its KT-related practices were still evolving. One of the motivations to build up the Campus Arena was the need for a new office space as well as the lack of a recognizable landmark for the TUT, but the key issue was to pursue the *renewal of the university–business co-operation* by bringing companies to the heart of the campus and by offering some new practices for collaboration.

The premises are owned by the University Properties of Finland Ltd (SYK). The SYK is a fairly new actor in the real-estate business, as it was established to maintain virtually all the premises hosting the Finnish HEIs (excluding Aalto University and the University of Helsinki), and it has been actively searching for new and innovative solutions (e.g. learning campus, co-creation) to maintain the value of the premises.

The biggest single client of the premises is the TUT. The basic services, like the library, IT services and extension studies unit, take up most of the floor space on the lower floors and bring students into the building. These and other services targeted to the public are located on the lower floors, and the top floors of the tower are for the company use; on the fifth floor is the membership-based "Campus Club" and the sixth and seventh floors are occupied by Regus Kora, which provides office space for the temporary use of companies within its global network.

The efforts to find new and appropriate models to collaborate with companies has been an important part of the planning process service concept of Campus Arena and was developed by the team with members from both the SYK and the TUT. They organized workshops for companies, students and university personnel to find the right collaboration models as well as spatial solutions. Several key companies in the area have participated in the development and design of the concepts. The selection of

tenant companies with relevant profiles to the arena is also part of the process, and the TUT holds a veto right in the selection. This is to ensure that all the companies that have their offices in the building will also foster the research and educational goals of the university. Funding for the development of the service concepts was offered by the TUT and SYK.

Since the process included the physical building of the premises, the physical office spaces were also planned to support the collaboration (co-working spaces, big rooms, etc.). In addition to the architectural solutions, maybe more importantly, several service concepts were developed or acquired to support the co-operation processes. Services were planned from the value creation point of view: they aim to foster the opportunities of actors to move "across the borders in their value creation process". This may be seen as an attempt to move from networking and interaction towards more "organized collisions", in which the interaction is defined in more detail to support some of the innovation, or co-creation, between the actors.

Such service concepts that support the co-creation in the Campus Arena (and more broadly in the TUT) include traditional demonstration sessions of the researchers and students, who give presentations about their projects, or "Problem Fridays", which are problem-solving workshops in which researchers and students seek solutions to the problems defined by the companies.

There are also services that are developed more specifically for the new Campus Arena with an emphasis on co-creation and co-working opportunities. The *Campus Club* is an SYK concept whereby premises are not rented to the companies but they may buy membership of the club for three years (for a monthly fee). Members receive ten membership cards for their personnel. The Campus Club is planned to have about 50 member firms, and the premises may host a maximum of 300 people at the same time. Members may bring their projects, demos or devices to the club and work with other members, students and researchers to develop and test them. The club offers flexible space for collaboration (e.g. "big rooms"). This is a different concept from, for example, many "cluster-based" projects, in which teams may work apart from each other and the most interactive link between the companies is the steering group of the project.

Both the TUT and the SYK facilitate the club's activities. The concept is based on the idea that shared space is not enough (co-working): the interaction has to be facilitated more actively (co-creation) to trigger new research projects. These are, for example, innovation workshops several times a year. They are half-a-day-long to one-day-long ideation sessions with at least two criteria: behind the idea there must be at least two different companies and, in addition to them, both students and researchers have to participate in the session. Innovation workshops and their follow-up workshop consist of the key co-creation process to innovate projects and develop them to the further implementation phase. The first workshop was organized in autumn 2015 with a smart-glass theme, and it was facilitated by the personnel from the other platform, Demola.

The Campus Arena building itself may also be used as a testbed for the researchers and companies, where they can test a new service, product or technology (e.g. digital solutions for the maintenance of premises). These testing results may offer a first reference when the new product is marketed or funding for the further development to be applied.

Further potential offers the development of the TUTLab concept in early 2016. The aim is to combine and open the laboratories of the campus to be available to students as well as external users (i.e. companies), often free of charge. The concept is an extended version of the FabLab implemented at the MIT, as it should include an IT proto-lab and a lab for heavy machinery solutions.

The *Demola concept* is also part of the Campus Arena activities. The concept was modified to serve better the needs of engineering and machinery and their integration with electronics. The need for a new model was initiated by the companies, and the Demola model is already well known by the students and easy to adjust to the new environments.

The Regus Kora office hotel is also building a new Kora at Tampere concept that is part of the model that it uses on several European university campuses. The benefits of this service include office space that is flexibly available in various locations around the world for the customers – entrepreneurs, firms or research groups. However, it does not provide any actual co-creation processes.

Of course, various forms of IPR management are also needed in open innovation environments. In innovation workshops everything is open, but after the next steps IPRs will be clearly defined in agreements. In the TutTLab IPR contracts are not necessarily needed, because for example contracts from Demola may be used for this purpose and the TUT has rules for the student assignments that may be applied in this context as well. The various services in one location offer opportunities to extend the practices and potentially the impact of activities that converge on education, research and innovation on the campus.

Measurement and IPR issues are relevant to the Campus Club, and they will follow at least the number of people and member companies using the premises. They will also conduct discussions with companies and follow up the implementation of co-operation plans. Furthermore, the number of projects and the satisfaction of members will be monitored, as well operative actions like the movement of furniture (big rooms) that indicate the interaction among the people on the premises.

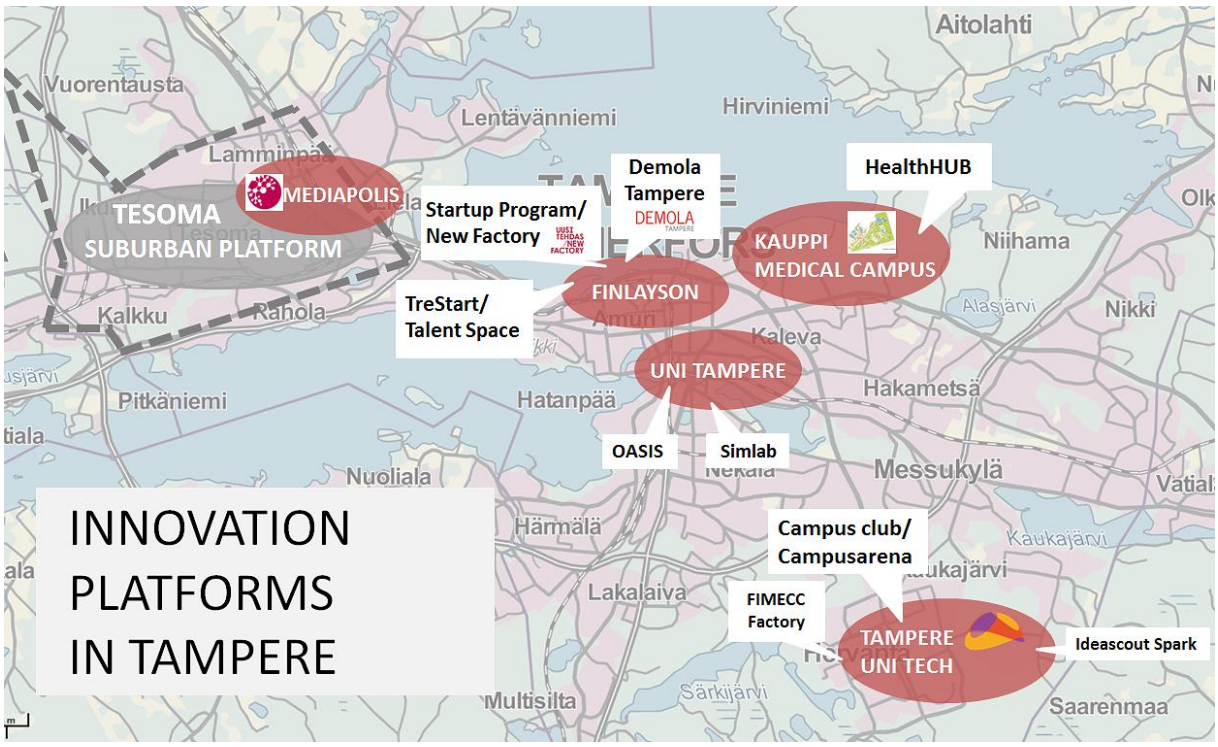
2.7 Future prospects and key challenges in OIP-based development: towards inclusive innovation policy design?

The obvious observation from the cases above is that they are constantly strongly evolving as are the industrial structures and HEI organizations of the Tampere region. The key question related to OIPs' role in the KT and innovation policy design is then maybe more systemic than organizational only. The co-creation practices discussed above (e.g. Demola, Campus Club) or even the well-organized set of these practices (e.g. Campus Arena, New Factory) are not necessarily fully new phenomena as such. However, *implementing a systemic approach and comprehensive policy design* to deploy and develop these "open innovation engines" and their constellations as "innovation factories" would clearly renew the landscape of regional innovation policy. OIPs offer tools to build institutional capabilities to leverage the societal impact through systemic and comprehensive policy design.

In short, the future challenges and systemic sore spots may be simplified to the following four themes: 1) the emergence of OIP networks, 2) OIPs' capability to create "network effects" and foster civic engagement further, 3) the cultivation of an open innovation culture among the local firms, public organizations and start-ups and 4) capabilities to offer the public sector's open data and public procurement processes as new sources for innovative business development and public service renewal. In the following these themes are briefly discussed.

The emergence and orchestration of OIP networks refer to the development of management capabilities in OIPs and on the more strategic level among the regional stakeholders. This includes the conceptual understanding of the OIP approach to distinguish it from policy logics (e.g. clusters) and supportive capabilities to measure and communicate the activities. Platform management and orchestration of the regional OIP network unleash the potential of an interconnected system of platforms with recognizable service profiles and comprehensive and compatible service offerings for open innovation activities as a crucial part of the regional innovation ecosystem. The seeds of this kind of network structure seem to be evolving in Tampere, but it is still at too immature a stage to be evaluated.

Figure 6. Emerging network of OIPs embedded in urban knowledge-based development (as illustrated by Regional Council of Tampere 2015)



Orchestration is a central question in the future policy making and management of platform networks or constellations. For the platform management the question of revenue logics is also urgent. The facilitators of the platforms do not provide the content, but the users of the platform are the actors in the value creation process; therefore, the revenue logic is not as clear as it is in traditional business. The capability to create a network effect is often crucial for the OIP to survive without regional development fund-based financing. In addition, the public–private interface is even fuzzier than in the traditional economy, and this makes the question more complex. The potential may be harnessed only if the competences and capability to collaborate in the region are sufficiently developed.

OIPs' capability to create network effects and foster further the civic engagement refers to development whereby not only the number of new (and returning) clients whose "problems" OIPs solve have to increase but also problem solvers, citizens, students and unemployed, for example, have to engage in the process in increasing numbers. Living labs have been a commonly used method for the testing and to some extent the development of the services in the urban environment. However, real civic engagement requires stronger incentives and therefore more carefully built feedback loops and IPR management practices in the OIP environment. The value creation with users should not be based only on the volunteers or ostensible rewards, but real benefits for the "external parties" should also be created to ensure the activities in the long run. Demola is a good example of the right incentive structure for both the parties in the co-creation projects. In sum, the number of clients and innovators is important for the renewal and highly dependent on the incentives that the OIP system is able to deliver.

The cultivation of an open innovation culture promoting open innovation and entrepreneurship in the region refers to the opening of the R&D routines of big firms and other organizations. The challenges include the following: Are the OIPs able to attract them as clients to use the co-creation services? Do the start-up culture and its supportive structures enable a meaningful amount of new business to grow up from this new culture? Despite the vivid discussion around open innovation during the last decade, it is still a rather rare practice among big firms. Equally, although the

start-up culture has already been visible in most urban environments for a while, the real impact on the economic development remains random or modest, although it has been growing for example in the case of Tampere.

The public sector and open data as a new source for innovative business offer various opportunities to use OIPs in the creation of both new, more efficient public services and businesses based on the public data and innovative procurements. Various public–private models of OIP funding and ownership as well as service production models should be carefully developed in the context of regional economic development processes (e.g. alliance models).

While these questions are still very much waiting for the right answers, they also point out the potential of the OIP approach to reach out from the HEIs towards the much wider society and its renewal. Civic engagement moves beyond the business-oriented KT approaches. This, again, requires new indicators and performance measures for the HEIs to foster their activities in this co-operation with the society, especially as the cases above clearly indicated that pressure to create collaboration models has so far emerged mostly from outside the HEIs. The examples of OIP approaches that have been applied in cases that reach beyond the KT focus in the 6Cities programme include:

- The employment of highly skilled workers in the context of business development and competence building of local companies, in which the social goals for employment are closely integrated into the growth of the companies through competence building, which aims to increase the profits and the employment of unemployed competence providers.
- An urban development project with both social- and business development-oriented goals, when participation and public procurement practices are important elements of the OIP structure. These may also include new kinds of public–private partnerships (alliance model), in which co-operation between private and public service providers is fully integrated instead of the privatization of services.
- Digital platform development in terms of the digitalization of public services' development of Internet-based business opportunities by opening the public data sources for entrepreneurs.

This may be seen as *an inclusive innovation policy for the developed economies*, which suggests that the inclusive processes engaging more people in innovation activities may also offer more benefits to a wider group of people. This may take place through their roles as innovators or as the users of the end-products or services or both. Thus, the policy design is parallel to those that are suggested for many developing countries (e.g. OECD, 2014, 2015), promoting the idea that not only innovations as such are important but also the inclusive process itself. The inclusive approach is parallel to the user-driven or open innovation approaches but has a different point of departure.

In open and user-driven approaches and in creativity discussions more generally, the innovation process is believed to benefit from the wider engagement of users, various stakeholders or professionals as providers of useful knowledge and insights into the process. From the inclusive view, it is assumed that wider participation in innovation activities potentially contributes to the quality of life of those people who may participate. The assumption is that they, for example, receive returns from the use of their knowledge and may create networks or learn how to engage with and benefit from the surrounding innovation ecosystem. Benefits are acquired not only from the innovative outcomes but also from participating in the process (e.g. when solving the societal grand challenges).

The innovation and economic activities continue to agglomerate in city regions along with social and urban problems. Therefore, fostering innovation activities through open innovation and co-creation processes that engage a wider group of users and other stakeholders in the processes, far beyond the university–industry–government collaboration in business development, is a crucial (and systemic) issue. The platform approach, with users providing value to each other, the facilitation of network effects and combinations of digital solutions and physical innovation hubs, should be considered carefully as a significant part of the solution to contemporary challenges in both KT policy and regional knowledge-based development policies more generally.

It seems that the goals of the HEIs in terms of the OIP environment are not clearly defined in all the cases. The case of Campus Arena is different, as it is the result of close co-operation between the University of Technology and Finnish University Premises Ltd, with clear goals to renew the university–industry collaboration and make careful consideration of the resulting mutual benefits. Importantly, the process was linked to the substantial building process, as the Campus Arena itself was built as a new landmark building in the middle of the campus. In the case of Mediapolis, the platform activities were still evolving at the time of the study and thus their more specific role in the strategies of the HEIs, especially of the UAS, in the campus were also emerging. In the case of Demola, the practices in terms of interaction with all HEIs were already established, but the role of the OIPs in the university strategies is still somewhat undefined. However, as the three HEIs in Tampere have reached an agreement to integrate into one university and have already launched the process in late 2015, the role of OIPs has been discussed more clearly in this context. Especially Demola, which already provides projects and credit points for the students of all three HEIs, may gain a much more established position in the educational programmes of the new university. While this is highly important and positions the OIPs in the knowledge triangle more clearly in relation to education, the other urgent task would be to clarify the role of the OIPs in the research and innovation continuum. Currently, the discussion seems to emphasize the innovation and commercialization end of applied research, but the relation with more basic research types of activities is still fairly undefined, especially at the strategic level of the KT.

The societal impact of OIPs can be assessed to some extent for example from the feedback from students, the number of conducted projects and the licensed cases or emerging companies. However, it is evident that the measurement of the performance needs to be renewed if the OIP strategy is seriously applied and governed as a central tool for knowledge-based regional development and/or the KT strategy. Many of the impacts are intangible (e.g. the emergence of an "open innovation culture") or relate to ecosystem development (e.g. links among the clients and returning clients). Further, the OIPs should be reactive and dynamic in relation to their environment and ecosystem, meaning that more online types of measurement tools (e.g. based on automatized data mining and analyses) that are able to provide up-to-date information are needed. OIPs are also applied to social problems and urban development that require even further revision of the measurement tools and indicators as tools to orchestrate the OIPs and related KT strategy.

Finally, to reflect the knowledge creation in OIPs in more abstract terms, the questions of knowledge bases (e.g. Asheim et al, 2012) and proximities (e.g. Boschma, 2005) are briefly covered. Firstly, in terms of different knowledge bases, for example, Mediapolis and the case of the "Lintukoto" immersive game experience are a highly illustrative example of the integration of different knowledge bases. The project integrated technology like 3D glasses (analytical knowledge base) with storytelling (symbolic knowledge base) in an attempt to create a novel experience for the participant. Obviously this is a general course of development in the gaming industry but may also be utilized in many other fields in business and in the development of public services. However, there are still steps to take to provide a scalable and platform type of environment to foster the integration of different knowledge bases and their full potential, although the basic elements are now well recognized. Demola offers a different view of the integration of knowledge bases, as it frequently combines students from different fields and thus nurtures the idea of cross-fertilization among future knowledge workers, consequently building future prospects beyond the given student projects as such.

Secondly, the absence of geographical proximity in the case of digital platforms is evident, strengthening their ability to gather knowledge from a wide group of people. However, in the case of the physical innovation platforms, hubs, in the case studies, the geographical proximity enabling face-to-face interaction was clearly adding value, not only in terms of professional knowledge but also in terms of self-confidence and a better understanding of the operational environment, including cultural factors and relations among the key actors of the ecosystem. According to these preliminary results, the key question is not whether the physical proximity or distance should be a primary target in the facilitation processes of the platforms but how to facilitate processes whereby the cognitive, social or institutional distance may be decreased to a sufficient extent to foster the productive learning processes (e.g. Nooteboom, 2007).

3 Conclusions – tentative policy recommendations

The conclusions of the Finnish country study and local case study of Tampere may be presented as follows in the form of key policy recommendations based on the interpretation of the current situation.

There is a **lack of funding-related incentives for the HEIs**, especially the universities, to implement KT strategies and practices with a clearly defined goal of societal and economic impact or civic engagement in general. While basic research and its measurement with a citation index are evidently a relevant part of the KT governance, much better formulated measures and *incentives* are needed to govern the increasingly important societally and economically important interactions, such as KT and OIP activities.

The **key actors** in the regional innovation policy to foster the KT and OIP activities **may be semi-public local innovation agencies or regional development agencies, not necessarily HEIs** themselves. This is likely to be, at least to some extent, a consequence of the lack of incentives, as mentioned above, and should be considered in the regional policy design as well.

The **key question** related to the OIPs' role in the KT and innovation policy design **is more systemic than organizational**; *implementing a systemic approach and comprehensive policy design* to deploy and develop "open innovation engines" and their constellations would renew the regional innovation policy and provide tools to build institutional capabilities to leverage the societal impact of HEIs.

The emergence and **orchestration of OIP networks requires the development of management capabilities** at the operational level in OIPs and the more strategic level among the regional stakeholders. These include: the conceptual clarity of the OIP approach, the position among the policy approaches (e.g. clusters) and capabilities to measure the performance at both levels and to communicate their activities and services clearly to the target group and stakeholders.

The capability to create a network effect is often crucial for the OIP to survive, without regional development fund-based financing. The users of the platform are key contributors to the value creation process; therefore, the revenue logics are fairly challenging to formulate, increasing the capability building challenges. To accomplish this goal, the platforms need rewarding incentives for all the participants (including citizens, professionals, students, unemployed individuals and companies).

The cultivation of an open innovation culture promoting open innovation and entrepreneurship in the region is the important part of the OIP activities, and thus the real impact of open innovation and a start-up culture should be better recognized to understand the impact.

Public sector and open data as a new source for innovative business offer various opportunities to use OIPs in the creation of both new, more efficient public services and businesses based on the public data and innovative procurements.

The OIP approach reaches out from the HEIs towards a much wider societal impact. Civic engagement moves beyond the business-oriented KT approaches. This, again, requires new indicators and performance measures for the HEIs to foster their activities in this co-operation with the society.

The OIP approach may be seen as a **tool to implement the inclusive innovation policy for the developed economies**, which suggests that the inclusive processes engaging more people and other actors in innovation activities may also offer more benefits to the wider group of people. Therefore, OIPs should be framed in the wider policy characterized by the inclusive and/or social innovation approach.

The **innovation and economic activities continue to agglomerate in city regions along with social and urban problems**. Therefore, the fostering of innovation activities through open innovation and co-creation processes that engage the wider group of users and other stakeholders in the processes is a crucial and systemic issue.

The position of OIPs in the KT and regional development strategies as sites of knowledge creation and deployment should be clarified, and their relations especially with basic research should be defined better and designed further.

The OIPs offer various opportunities to foster the integration of different knowledge bases and to narrow the cognitive and social distance among the actors, but scalable and systemic practices are still in their infancy, although some individual cases may be promising. **More research on this topic is needed**.

To understand and measure the societal impact of OIPs, a **revision of the measurement tools and indicators used in regional policy are necessary**.

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