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The Role of Science Parks in Smart Specialisation Strategies

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Abstract

Science and technology parks (STPs) are very common instruments used by regional and national authorities for regional development. Their main objective is to foster science-based growth poles to stimulate economic diversification away from declining industries. Today, STPs are present in many European regions. They concentrate a wide range of innovative companies and research organisations, and as a consequence the overall knowledge intensity of these places is very high. STPs are thus likely to include seeds for the domains of knowledge-intensive specialisation, on which regions can rely to increase their competitiveness. This is why STPs seem well placed to play a key role in innovation strategies for smart specialisation (S3). We argue that the diversity of STP models by definition means that their contribution to smart specialisation is very likely to depend on the specific context. Three key roles for STPs in the design and implementation of smart specialisation strategies are proposed: (1) STPs may provide an adequate innovation ecosystem for the development of pilot innovation initiatives, well in line with the entrepreneurial discovery process that should drive the regional economies towards new, distinctive and competitive areas of activities. (2) STPs can play an important role as one of the relevant stakeholders forming the quadruple helix of innovation actors shaping smart specialisation strategies. (3) STPs can add the needed external and outward-looking dimension to smart specialisation strategies, a dimension that is today still very much under-developed. Yet, these contributions from STPs cannot be taken for granted. We identify limitations and success conditions for each of the three roles. Illustrative examples of STPs in Finland, England and the Netherlands show how STPs can actively and creatively contribute to the design of innovation strategies and to the external connectivity of their home regions.

Keywords: Smart specialisation, science and technology parks, innovation ecosystem, regional development

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1. Introduction

Science and technology parks (STPs) are very common instruments used by regional and national authorities to boost their knowledge-intensive development. They have been established already in the 1950s in the US, with the initial aim to foster the commercialisation of university research. Subsequently, STPs in many countries have been integrated in the portfolio of regional development tools by regional planners, keen to follow the models of Silicon Valley and the Stanford Industrial Park (Saxenian 1996). Their objective was to boost regional development around science-based growth poles and to stimulate economic diversification away from declining industries. In response to these regional development goals, European Cohesion Funds have been called to support the establishment or the development of STPs. National initiatives have also supported STPs, with the aim to attract inward investment and create development poles either in central urban areas or as a mean to establish development poles in regions.

Today, STPs are present in many European regions: they concentrate a wide range of innovative companies and research organisations, and as a consequence the overall knowledge intensity of these places is very high. STPs are thus likely to include seeds for the domains of knowledge-intensive specialisation, on which regions can rely to increase their competitiveness. This is why STPs seem well placed to play a key role in innovation strategies for smart specialisation (S3), in particular with regard to the transformative goal of S3.

But what could this role of STPs consist of? And what are the challenges faced by STPs willing to bring their contribution to – and benefit from – smart specialisation strategies? This policy brief provides responses to these questions based on the exploitation of existing knowledge with respect to the role of STPs in regional development. Section 2 starts by highlighting the diversity of STP models: this suggests that there might be different answers to the question of the role of STPs in smart specialisation, as some models might better fit S3 objectives than others. We then discuss the findings from empirical research about the success factors for STPs in influencing regional development paths, and links this to the various STP models. In section 3, the discussion starts with the specific challenges of S3 and relates these to the understanding of STPs' role in knowledge-intensive regional development.

Three key roles for Science Parks in the design and implementation of smart specialisation strategies are proposed:

1. STPs may provide an adequate innovation ecosystem for the development of pilot innovation initiatives, well in line with the entrepreneurial discovery process that should drive the regional economies towards new, distinctive and competitive areas of activities.

2. STPs can play an important role as one of the relevant stakeholders forming the quadruple helix of innovation actors shaping smart specialisation strategies.
3. STPs can add the needed external and outward-looking dimension to smart specialisation strategies, a dimension that is today still very much under-developed.

These contributions from STPs cannot be taken for granted though. We identify limitations and success conditions for each of the three roles. Illustrative examples of STPs are provided in [Section 4](#). The concluding section spells out a new agenda for STPs, in view of making the most of their potential contributions to smart specialisation strategies across European regions and states.

2. The role of Science Parks in regional innovation strategies

2.1. The S3 concept

Smart specialisation builds on national and regional assets, strengths and potentials, and focuses on a limited number of priorities to stimulate growth. Smart specialisation is not limited to only areas of research and innovation, but also aims at non-science innovation such as social innovation, innovation in the public sector, innovation in creative industries and service innovation. The very aim of smart specialisation is to promote job creation, for example by stimulating entrepreneurship and collaboration between education and research institutions and private sector. It is meant to meet the challenges identified in the Innovation Union by promoting partnerships within quadruple helix arrangements (public entities – knowledge institutions – businesses – civil society), as well as to address grand societal challenges such as aging society, social inclusion, environment and climate change.

Innovation strategies for smart specialisation are integrated, place-based economic transformation agendas. S3 is a dynamic and evolutionary process grounded in an entrepreneurial discovery process where governments facilitate and orchestrate discussions with partners across quadruple helix. In fact, S3 requires all stakeholders located in the territory being engaged in the preparation and implementation of the strategy. S3 thus offers a great opportunity, yet responsibility for STPs to shape the future of their home region or country.

2.2. The STP concept

Given the long history of STPs, it is not surprising that the concept has given birth to a diversity of different models. Differences stem from their origins, driving forces and national/regional contexts

in which they have been established. The core elements of the concept are encapsulated in the definition adopted by the International Association of Science Parks and Areas of Innovation (IASP):

A Science Park is an organisation managed by specialised professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a Science Park: stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities.

From this definition, we can infer five key elements that characterise STPs:

1. A localised economic development goal;
2. A focus on fostering science-industry relationships;
3. A priority placed on innovative and technology-based activities;
4. The provision of value-added services to companies;
5. A property-based initiative.

The difference in priority amongst these elements in Science Parks design and operation generates a wide diversity in Science Park models:

- Some STPs concentrate on property management, while others have developed a wide range of professionalised 'soft' business support services;
- Depending on their funding model, some STPs may prioritise the commercial viability of the property, possibly using less strict criteria for accepting firms, while others put a higher premium on high technology and potential for knowledge exchange with tenants;
- Partly due to their history but also in line with the environment in which they are located, a number of STPs connect mostly to global actors with few relationships with their regional environment, while others are key regional players with their tenants being deeply embedded in the regional innovation ecosystem;
- The presence or absence of a top level research institution or university at the core of an STP, and the strategies pursued by these institutions in terms of their third mission (service to society), influence the nature and depth of science- and research-driven relationships within STPs;
- Finally and most importantly, depending on the thickness of the regional innovation support environment, some STPs serve as central innovation agencies in their regions, while others are just one instrument amongst many others that are available in a territory for the support of knowledge-intensive development.

This diversity in models generated by these differences in STP strategies, combined with differences in size, nature of tenants and funding models, has to be taken into account when discussing the role of STPs in regional development as a whole and in S3 in particular.

2.3. Science Parks' role in knowledge-intensive regional development

The role of STPs in regional development can be discussed according to two different approaches, a linear or an interactive one (Table 1). The linear view sees STPs mainly as instruments of technology transfer, emphasising their role in supporting research-based commercialisation. In this understanding, the role of STPs is mainly to act as facilitators in these exchanges, as a bridge from knowledge sources to recipients. To this aim, STPs offer place-based transfer services addressing the gap between the business and scientific communities.

In contrast, in an innovation ecosystem view on STPs (interactive approach) the overall innovation environment plays a key role in the operation of STPs. Here, STPs are seen as nodes in wider networks of actors supporting innovative business development. Technology transfer is only one of the ingredients of successful innovation, and the knowledge exchanges take a multi-dimensional character rather than a science-to-business line. The aim of STPs broadens to a mission of supporting innovation co-creation. An interactive vision of STPs, thus, reflects a much broader role for this instrument in regional development.

Table 1: Linear versus interactive view on STPs

Linear view on STPs as BRIDGES	Interactive view on STPs as CLUSTERS OF COMPETENCES
Technology transfer	Dialogue creation
From source to recipient	Multilateral exchanges
A specific place	A node in a system
Focused support	Multiple support
Material support	Learning support
In-house support	Clearing house
Technology gap	...and managerial gap

Source: Nauwelaers 2009a.

Any assessment of the actual success of STPs on the development of their environment is obscured by the lack of consensus on these expected benefits. Typically, universities would expect an impact in research commercialisation; private investors seek return on investments in commercial premises; while regional authorities will look for wider regional development effects such as new companies and new jobs created as well as various other spill-over effects on their economic activities. It is generally acknowledged that the main benefits of STPs are found in the following areas (European Commission 2008):

- Increased place visibility and attractiveness, conferring a high-tech image to the region where STPs are located. This improved image can play an important role for attracting talent and investors, and for creating good conditions for accessing a pool of high-skilled talents;
- Provision of adequate infrastructure (incl. information and communication technologies) for research- and technology-intensive businesses, which can be shared with public research organisations and universities located in the STP;
- Provision of a range of tailored business support services targeting specific categories of firms and high-tech businesses. Theme-oriented STPs (on ICT, life science, etc.) may have more opportunities for developing specialised services (IPR, management support, technology brokering, etc.) and for attracting a critical mass of professionals specialised in these areas.

The creation of a stimulating milieu for the informal exchange of tacit knowledge amongst firms, and between firms and research organisations, which contribute to high levels of social capital, is another alleged benefit from STPs. In theory, being located in an STP populated with knowledge-intensive actors from different sectors and technology fields, provides great opportunities for innovative combinations and cross-innovation. This type of qualitative effects is, however, much less straightforward to demonstrate than those previously stated. Several studies have had disappointing conclusions on the intensity of the internal networking effects of milieus in STPs. A review of the vast literature dealing with impacts of STPs on their environment is largely inconclusive (OECD 2011):

- Some studies find that the correlation between STP presence and intensity of high-tech development is due to third factors, such as urban density;
- The additionality of STPs is also questioned, since they may gather high-tech businesses that are present in a region anyhow rather than provide new conditions for their development. STPs may be a reflection of the quality of the innovation environment rather than a factor in itself driving innovation. Tautological results are also frequently found in studies that underline the fact that STPs are more successful in more advanced regional environments;
- Studies that have found a correlation between the high performance of firms and their location in STPs have often restrained from claiming that STPs increase innovation performance. A selection bias is likely to explain the difference of performance between on- and off-park companies. Some studies have also found little difference in firm performance and survival rates between matched pairs of firms on- and off-parks.

We can conclude that STPs, while providing a favourable and potentially fertile environment for innovative firms, are not automatically generating such positive impacts on regional development.

Recent research has put in evidence a main overall success factor for STPs to play an important *additional* role in regional development: their tight integration in the regional ecosystem and close interaction with, and complementarity to, regional innovation support policy. This is well in line with the interactive model depicted above, in contrast with the narrower linear model of STPs. As expressed by Rowe (2013), a new model for STPs seeking to foster an innovation agenda benefitting their regional environment is visible when they:

- *Are seen as an integral part of the local innovation ecosystem that understand and work with it and also design and deliver programmes that reduce weaknesses in the innovation ecosystem. STPs may also create collaboration spaces to bring innovation actors together and act as host to the programmes of other actors as a means for increasing the visibility of the entire innovation ecosystem.*
- *Balance the need for short-term financial returns to secure sustainability against the opportunity to accelerate innovation-led business and economic growth. Where the public sector is involved in an STP, the subsidies and grants they provide serve as 'patient money' allowing the STP time to secure its economic development objectives as well as financial sustainability.*
- *Engage with the private sector to secure capital for development as the park proves they can attract inward investment (both national and international) and / or the park stimulates new innovation-led business activity in other ways, often involving partners in the process. Where the demand from new technology businesses in a locality is already strong the private sector may well take the initiative alone in creating an STP.*

It follows from this view that STPs can play an effective role in regional development when they are part of a policy mix for regional innovation, including other elements necessary for innovation support such as: funding programmes for collaborative research (thematic or not); mobility schemes; various types of support for entrepreneurship and the creation of new technology-based firms; venture capital and other types of funding sources for knowledge-intensive business; etc.

Other important success conditions are rather internal to STPs and concern the strategy of the STP management and their main tenants:

- The provision of "integrated policy mixes", offering more effective support for innovation; coupling real estate services with innovation support in broader sense is a strategy that is more effective than the provision of fragmented support (Nauwelaers *et al.* 2009b).
- The role of a professional management team cannot be under-emphasised as a success condition for the role of STPs in promoting knowledge-intensive growth. The development of a strategic vision is central to this role, since it solves tensions between conflicting objectives and helps to adapt all services to one unified vision.
- The connection to other off-site actors and the presence of an internationalisation strategy is more and more recognised as a key element for STPs and their role in innovation support, while in the past most attention was traditionally paid to internal on-park interactions.

- Since higher education institutions and public research organisations are frequently present in STPs, the contribution of these actors needs also to be maximised: the role they want to play and their strategies in terms of their 'third mission' is a key factor in leveraging the potential of public research assets (people, infrastructures, networks) for the wider benefit of STP tenants and the surrounding environment.
- Similarly, large firms located in STPs might pursue open innovation strategies which are conducive to the development of fruitful in- and off-park interactions. Multinational companies which are footloose provide a much weaker asset for turning an STP into an effective regional development tool.

3. STPs' role in smart specialisation

In the previous section, we argued that STPs can play a positive role in fostering localised knowledge-intensive growth, when they are embedded in their regional (policy) environment and develop their strategies with this goal in mind. In the current period of EU funding for regional development and innovation until 2020, new development policies will evolve following the smart specialisation concept. National and regional authorities across Europe are now required to design innovation strategies for smart specialisation to ensure an effective use of regional development funds. S3 makes strategic innovation a core element of regional development policy. It is a novel ex-ante conditionality that requires policy-makers to design evidence-based innovation strategies focusing on a limited number of innovation priorities and informed by a broad and continuous involvement of stakeholders. Continuous policy learning and an "entrepreneurial discovery process" with all relevant stakeholders are important elements of this legal requirement for the use of European Regional Development Funds. How can STPs address these specific S3 challenges? The potential role for STPs in feeding smart specialisation appears clearly when considering the current bottlenecks faced by regional policy-makers in charge of developing this new generation of territorially based innovation policies.

Three proposals for this role are developed below, and discussed in the following sub-sections. The first and most obvious bottleneck in S3 relates to the prioritisation of those domains of activity that are likely to create the basis for future regional development. How to detect those fields in a bottom-up fashion, relying on an entrepreneurial discovery process that is mostly driven by companies but also nurtured by the contributions of knowledge institutions and other regional actors? Our argument here is that STPs of a "new generation" could serve as ecosystems for experimentation and demonstration of innovation pilots, thus contributing to the S3 entrepreneurial discovery process (see [Section 3.1](#)). This is a potential role for STPs which meet the success conditions listed above by concentrating knowledge actors and their external connections.

The second challenge for S3 is the engagement of a wide range of stakeholders, both at the design and implementation stage of the strategy. This is needed to secure the endorsement of the priorities by the main innovation actors and an adequate delivery of policies in line with the S3 priorities. This is why we argue that STPs have the potential to be key actors in the regional quadruple helix for smart specialisation (see [Section 3.2](#)).

The third, and less widely acknowledged challenge for S3, is to develop the external dimension of the strategy. When priority fields are defined for regional innovation, regional actors need to assess their position in European and international value chains and to identify complementarities with external actors outside their region and country. This requires taking strategic lines of actions to connect to these outside actors and networks, as well as to support the building of regional actors' absorptive capacity. Today, regional development strategies are too much inward-looking. Our final argument is that STPs can help opening up S3 thanks to their own external networks. We discuss this aspect in greater depth in [Section 3.3](#).

3.1. STPs as ecosystems for experimentation and demonstration of innovation pilots

Smart specialisation in a region is not about picking “winning sectors”. It is rather about fostering the identification of new, original and distinctive areas of activities, which have the potential to transform the economy of a region. What becomes important here is the capacity of innovation actors to identify new business opportunities, tapping on their core competences and combining them with other skills and knowledge inputs, to create such new combinations. In this process, proximity can play an important role in facilitating exchange of tacit knowledge through face-to-face interactions.

STPs are characterised by an important concentration of knowledge-intensive activities and by the availability of a variety of high-level skills. This is a fertile ground for developing experimental innovation-oriented initiatives. However, this will only happen if (1) internal connectivity is high and if there is a favourable ecosystem in the STP facilitating the creation of new, unexpected combinations leading to innovation, and (2) the STP ecosystem is well embedded in the wider regional ecosystem, where other skills and resources can be accessed.

This role of STPs is even more demanding in the context of S3: new and distinctive, regionally-based competitive activities are often likely to be found at the *intersection* of sectors and clusters, rather than within traditional sectors. In this understanding, STPs are promoters of “related diversification”, an aspect that needs increased attention:

- Services provided by the STPs need to be well-tuned to the needs of existing clusters, but also to those of “informal clusters”, i.e. groupings of companies according to various types of interests, also outside of their traditional lines of activities.
- Traditional clusters might indeed not be the adequate target audience for STP services, if they do not promote cross-cluster innovation. Cross-cluster innovation and the creation of new activities across sectoral silos is a central element of smart specialisation.
- Practice-based innovation needs to receive new attention, in addition to the more traditional “technology push”-types of service activities delivered by STPs.
- On-park innovation pilots, exploiting combinations of tenants’ (and other actors’) assets are good testimonies of the success of a Park’s strategy. But attention should be paid to the scalability of the pilots, in view of their contribution to regional growth.

STPs’ challenges in becoming such fertile ecosystems are manifold, but two issues stand out:

- Funding: engineering a variety of EU, national and regional funding sources and from various policy domains (research, business development, environment, land planning, etc.) is needed to support innovation in an integrative way. Beyond the public funding question, a high share of private investment in services and operation of STPs is the best guarantee for success. And the new role of STPs places an increased focus on the need for ‘patient capital’ to support new, risky endeavours;
- Talent: the main fuel for the knowledge ecosystem in and around a STP is human resources, in the form of a skilled, adaptable and mobile workforce. Talent attraction and retention may well be the most important new strategic direction for new STP models in line with a new generation of regional innovation policies.

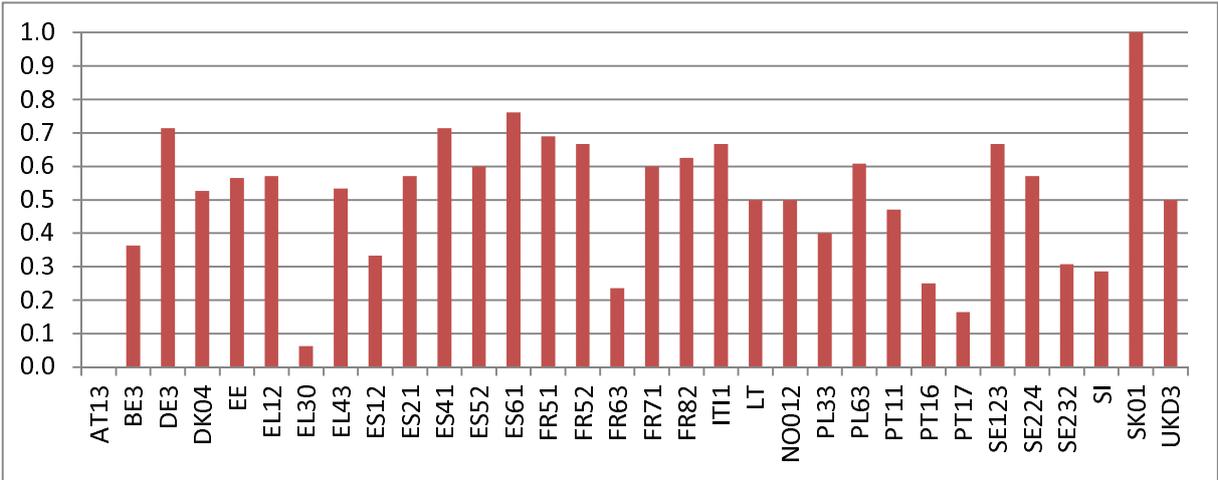
3.2. STPs as key actors in the regional quadruple helix for smart specialisation

Embedding a wide range of regional stakeholders is a key success factor of smart specialisation strategies. Reaching companies is often the main hurdle in this endeavour, because they are not easily mobilised around policy-oriented exercises. Thanks to their close relationship with companies, STPs have the legitimacy to act as an interface in the S3 partnerships, representing the voice of innovative companies. However, maintaining this type of interaction is not an easy job: it requires a high strategic profile, strong legitimacy and credibility from STP managers. And it is also not likely to occur automatically; managers must have a pro-active, constructive attitude in order to make their voice heard in policy-makers circles.

Involving stakeholders in S3 processes should, however, not turn into a competition between the “voices” of various regional actors, with those having the strongest voice becoming the winners. Instead, it is an orchestrated exchange of views, in which various regional stakeholders bring in their own contributions, but also undertake a search for new, emerging fields, where critical advantages can be built. STPs are well placed to contribute to these efforts, if they can demonstrate a genuine contribution to the S3 process and content.

To get an impression of the extent to which regional and national innovation priorities being currently developed overlap with the thematic focus of STPs, we provide below an explorative mapping based on currently available data. Figure 1 highlights the strong variation in the overlap between STP's thematic focus (which economic sectors they cover) and the S3 innovation priorities identified by policy-makers, which can be economic sectors or more specific activities involving cross-innovation. If STPs focus on relevant and (potentially) strong economic sectors for any given region or country, then STPs should be an important *interlocuteur* for policy-makers. A very low extent of overlap would then indicate that the STP's voice was not heard by policy-makers, or that their specialisation does not fit with the future-oriented S3 choices, and hence their thematic focus is not reflected in the selected innovation priorities. At the same time, STP managers should engage with other stakeholders and with the relevant policy-makers to make sure that promising innovation activities and priorities are included in the official innovation strategies.

Figure 1: STP overlap with regional/national priorities (n=32)



Source: Own elaboration based on the results of an IASP member survey of STPs' thematic industry focus and the Eye@RIS3 database on the S3 priorities being developed by EU regions and member states (<http://s3platform.jrc.ec.europa.eu/eye-ris3>). The categories are based on NACE codes. A value of 0 indicates no overlap in the respective region/country, whereas 1 indicates a full overlap between the S3 priorities on the one side, and the industry focus of the STPs based in that same region or country on the other. NB: Most S3 priorities are still preliminary and being negotiated until summer 2014, so that the database at this point only reflects the current intentions of regional and national policy-makers.

Stakeholder involvement in S3 builds on the idea of quadruple helix, which refers to government institutions, universities and research organisations, industry and civil society as key actors in innovation ecosystems (Carayannis and Campbell 2009). The role of STPs in the regional quadruple helix is likely to differ according to three elements:

- Density of the regional innovation ecosystem: in denser ecosystems and/or more developed regions, STPs are more likely to be only one amongst many legitimate stakeholders participating to the S3. At one extreme, STPs may deliver most innovation services themselves, acting like regional innovation agencies, or, at the other extreme, be a small operator within a range of powerful bodies and agencies with whom they need to coordinate. In between the two extremes, STPs can also sometimes take a role of orchestrators of a regional/national network of service providers.
- Scope and scale: smaller STPs may not get a sufficient level of visibility and legitimacy to play an important role in the quadruple helix. In regions where several STPs are present, complementarity and joint efforts are required to enhance their effectiveness.
- Institutional linkages with regional authorities: when STPs benefit from regional public funds, either structurally or on a project basis, they are likely to have more direct and more in-depth interactions with regional policy-makers and other constituencies in charge of S3.

3.3. External connectivity of STPs: Outward-looking territories and smart specialisation

While countries and regions develop methodologies to explore and understand their own local assets, their strengths and opportunities, they often struggle to strategically identify opportunities for cross-border, transregional and transnational cooperation. One possible step is to analyse and map the situation of the identified national/regional priorities in wider value chains. Transnational and international STP activities should be exploited to link to global networks and connect to foreign partners active in related activities. Thus, STPs should play a proactive role in S3 process. They are crucial for the provision of strategic intelligence and the linking of local actors with relevant organisations and firms abroad.

An outward-looking dimension and connectivity are essential features of designing and implementing innovation strategies for smart specialisation. (1) During the S3 design stage, the external networks maintained by STP stakeholders can be activated to feed into smart specialisation strategies and help define those areas of specialisation to be targeted as regional

priorities; an STP network can also provide access to experts in international innovation strategies and activities. (2) During the S3 implementation stage, communities of actors in STPs can act as living labs for developing innovative products or services, and these need to be open and well connected to external sources of ideas and knowledge. Such open living labs can constitute a core element for the implementation of smart specialisation strategies and inform a continuous entrepreneurial discovery process.

At the same time, interconnectivity is essential for STPs for a number of reasons. (1) Networks provide an access to resources including financial resources, human capital and knowledge. Since STPs support their associated stakeholders by ensuring a highly innovative environment, business opportunities and favourable working conditions, access to these network resources can add substantial value. STPs also have to attract resources from the outside, and this is significantly facilitated by their networks and external partners. Thus, the existence of networks and collaborative partnerships is crucial to ensure access to necessary resources for R&I activities. As STPs connect to other science parks and partners in EU countries and worldwide, they could be even more encouraged to explore their collaboration opportunities in the regions and (neighbouring) countries, e.g. by connecting to existing clusters across borders, using international innovation vouchers or promoting joint participation in R&I programmes and schemes. (2) STPs seek to increase their firms' and stakeholders' access to markets. This, of course, requires solid knowledge of these markets and the opportunities elsewhere. (3) STPs advocate and lobby for their partner stakeholders. The impact of these activities is higher when they are made through international networks and in coalition with international partners.

In sum, STPs with a sound internationalisation strategy can act as bridging agents with targeted actors outside their host region, helping to embed regional actors in wider networks and value chains. Regional, national and international networks of STPs (including the IASP) have an important role to play in supporting the outward-looking dimension of smart specialisation.

4. Examples of STPs from a smart specialisation perspective

The three cases of STPs presented below are taken from the contributions to the IASP-IPTS workshop that took place on 19 February 2014.¹ They illustrate different models and different types of potential STP contribution to S3.

¹ This workshop formed part of the Joint Research Centre's memorandum of understanding with the IASP. The agenda can be found here: http://s3platform.jrc.ec.europa.eu/documents/10157/0/Agenda_IASP%20JRC%20-%20the_role_of_SP_in_S3.pdf.

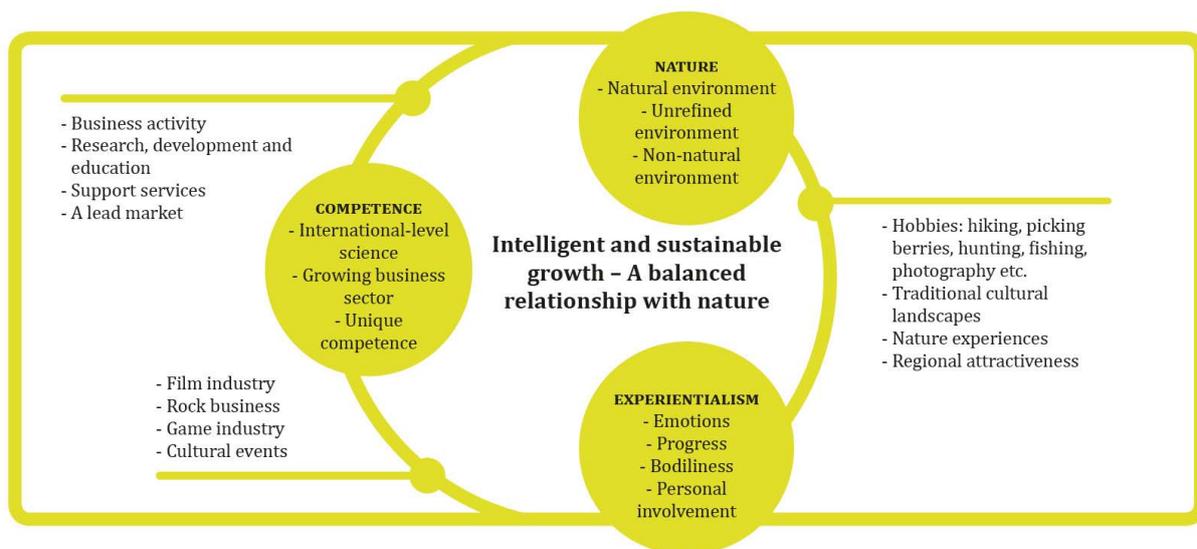
The Finnish Joensuu Science Park: Taking on a leadership role in smart specialisation

Joensuu is the capital of Finland's easternmost province in North Karelia. It is located close to the Russian border, about 400 km from Finnish capital Helsinki. Joensuu is a centre for trade, culture, education and technology. Three higher education institutions – the North Karelia University of Applied Sciences, the University of Eastern Finland and the HUMAK University of Applied Sciences – are based in Joensuu. The main industry sectors are metal, wood and forestry. Joensuu is the forestry capital of Europe with a stronghold in research, including the European Forest Institute and Joensuu Science Park.

The Joensuu Science Park has been established in 1990 and is part of the Finnish Centre of Expertise programme. It has specialised expertise in nanotechnology, future forestry industry, building technology and energy technology. The main goal is to promote the commercialisation and use of research and new information in the business operations of companies. Joensuu Science Park Expert Services support companies in planning, developing, executing and monitoring strategy-based development programmes. To this end, it offers an integrated package of services covering all aspects of innovation.

Due to its central position in the knowledge-intensive economy of the region, the Science Park acts as an orchestrator of regional resources for the definition of a joint vision concerning growth choices and the principles behind them. A strong principle behind the strategy is the identification and stimulation of interfaces and intersections of the technologies and industries selected in the strategy. The Science Park is well placed to engineer such a vision. Thanks to their involvement in the definition of a joint vision and the elaboration of the regional S3 strategy, the organisations involved in the platform created by the Science Park are committed to the choices made and the implementation of the measures. Three strategic domains of activities have been chosen: 1. Forest bio-economy; 2. technology and materials; and 3. creative industry and experiential content production. This priority setting was based on the following criteria: sufficient competence that meets high international standards; current significance to the regional economy; expectations concerning development and growth potential; special attention given to cooperation and interfaces between the focus areas.

Figure 2: Strategic framework for the development of the Joensuu region



The success of the regional smart specialisation strategy will be assessed according to the following indicators:

1. Development of revenue, export and jobs in the businesses operating in the focus areas;
2. Number of businesses founded in the focus areas/relocating into the region;
3. Amount of education organisations' internal and external funding for research and development in the focus areas & increase in the number of researchers and graduates;
4. North Carelia's Centre for Economic Development, Transport and the Environment, and Tekes, the Finnish funding agency for innovation: amount of funding granted to the development of the focus areas;
5. Joensuu Science Park Ltd. and Josek Ltd., a service provider to companies in the region: investments in the development of the focus areas.

The UK North East Technology Park (NETPark): One actor in the wider innovation ecosystem

NETPark is located in County Durham in the North East of England. This is a county which has diversified from the declined mining industry towards manufacturing and engineering, which accounts for about 20% of its economic base. The North East of England is home to four universities, including Durham University. Their research covers fields such as nano-technology, bio-science, electronics, chemistry, astronomy and engineering. Business Durham is the county's economic development company, delivering the environment for business and economic growth. NETPark is one of Business Durham's integrated portfolio of interventions, along with strategic account management, inward investment, enterprise and outreach.

The definition of the innovation priorities for NETPark builds on the strengths of Durham University and on the wider existing capabilities in North East England. NETPark focuses on supporting companies that are developing technology and products, particularly printable electronics, microelectronics, photonics and nanotechnology, and their application in the fields of energy, defence, and medical-related technologies. One particularity of NETPark is that it brings its services also to companies and actors which are located outside the park. The set of indicators used to measure the park's success reflects the concern about the impact on the wider regional environment.

Table 2: Hierarchical indicators for assessing NetPark's success

Position in hierarchy	Objective
1	Increased GVA by occupants in NETPark
2	Increased employment
3	Increased GVA per head
4	Increased number of technology based companies in county/region
5	Attraction of firms from other parts of the UK and abroad
6	Increased exports
7	Exploitation of technologies
8	Attraction of investment funds (including bank and venture funding)
9	Technology exchange work with universities in the North East and between companies
10	Retention of graduates from regional universities
11	Employment of local people
12	Raising employment aspirations amongst pupils studying STEM subjects in schools

To underscore the uniqueness of some of the assets the region has, NETPark has successfully argued for branding one of the S3 innovation priorities as "surface science". This has the advantage that outside investors, researchers and interested parties can more easily recognise a particular niche that Durham specialises in. The interaction of surfaces – air to air, air to liquid, air to solid, liquid to liquid, liquid to solid, solid to solid – encompasses some truly world-class university research, the two biggest corporate R&D hubs in North East England, existing innovation hubs, and significant numbers of SMEs. It can be both broad and narrow. The broadness enables the North East to tie a number of seemingly disparate activities into a critical mass in order to be able to compete globally. It can be narrow in terms of enabling specific activities such as pharmaceutical, filtration, materials, electronics, among several others, to grow and thrive. Although not directly responsible for developing the regional S3 strategy, NETPark was able to use its networks and

influence, working closely as a credible and respected partner with the North East Local Enterprise Partnership to ensure that this vital area was included.

Brainport Foundation and High Tech Campus Eindhoven: Ensuring the commitment of businesses towards a cross-border top technology region

Brainport can be characterised as a “horizontal triple helix collaboration” partnership, since large companies and SMEs, knowledge institutes and governmental organisations collaborate at various levels in the Dutch region of Noord-Brabant (Wintjes 2011). Out of all triple helix parties, the regional authority (provincial government) is perhaps the least dominant and most limited actor in terms of resources. The project management approach builds on the model of the former FP7 project which consisted of a large number of bottom-up initiatives with external project owners. Brainport tries to persuade the involved firms or knowledge institutes to take ownership of individual initiatives or projects. For this innovative approach, Brainport Eindhoven has won the Eurocities Award 2010 in the ‘cooperation’ category for their very promising cooperation among companies, knowledge institutions and government.

One of the key actors in the Brainport region is High Tech Campus Eindhoven. The establishment and continuous growth of the Campus is the result of efforts by several (collaborative) partners, with Philips as initial core partner, promoting open innovation practices in and around the campus. These parties’ aim is to develop the Eindhoven region as an internationally recognised technology region with the Campus as central high tech hub for the entire Dutch, German and Belgian cross-border region. The Campus is at the heart of one of Europe’s leading R&D regions: the Eindhoven, Leuven, Aachen triangle (ELAt) is an area that has acquired a strong European position in micro-electronics/nano-electronics and life sciences. Campus companies are responsible for nearly 40% of all Dutch patent applications.

In line with the limited role of public government and public R&D investments, the innovation system of the region is privately-driven, although public-private initiatives like Holst Centre and Solliance play an important role. The development of the innovation strategy was led by the former vice president of the multinational company DSM and the steering group also included a former manager of Philips. In line with the approach of Brainport to appoint external people as ‘project-owners’, many initiatives and projects are led, or ‘driven’, by businessmen. Private companies like Philips have become important actors in the governance of RTD policy in Noord-Brabant. Within ten years, High Tech Campus Eindhoven has developed into a dynamic mix of more than 125 organisations from global brands, leading research institutes, fast growth enterprises, service companies and high-tech startups with a large impact on the innovation performance of the region. With accelerator programmes like Next OEM, Startupbootcamp HighTechXL and two European

Knowledge Innovation Communities (EIT ICT and EIT InnoEnergy), companies, investors and innovation policy intermediaries became more involved in the further development of the Campus by providing incubation support. The Campus model of open, collaborative innovation has been adopted and implemented also elsewhere in the region.

The most recent regional innovation strategy is "Brainport 2020: Top Economy and Smart Society". The Cabinet of the national government requested the development of this vision and strategy along with a tangible implementation programme. The assignment was to "develop ... a cohesive and comprehensive vision of Brainport. At the level of Southeast Netherlands with Brainport as pivot and with a focus on cross-border links to Flanders and Nordrhein-Westfalen". Brainport thus is a prime example of how a science and technology park can use its external connectivity as a strategic asset.

5. Conclusion: The changing role for STPs in the smart specialisation era

Smart specialisation strategies constitute a turning point in the young history of regional innovation policies. They address the main development bottlenecks faced by European regions, namely: 1) lock-in in outdated specialisations and in industrial structures which are not conducive to growth and employment, and 2) fragmentation of investments for innovation, both within and across regions, leading to duplications of efforts with sub-critical mass and weak external connectedness.

The ambition of these strategies is high and an orchestrated contribution from all innovation actors in regions is needed to reach these goals. This cannot be achieved in a top-down manner. Science and technology parks are place-based, structural organisations that are active in many regions. Among the quadruple helix actors, these organisations stand out as suitable candidates to play a forward-looking role in the regional innovation partnerships, provided they support innovation experimentation. Yet, this does not give science and technology parks an automatic place in S3 governance. This place has to be gained based on the credibility of these organisations and the quality of their contribution to the smart specialisation goals.

To support smart specialisation strategies, science and technology parks should act as *boundary openers* at several levels:

- Internal to STPs: They can foster unique and innovative combinations between the assets present in the park, but also in the regional environment;
- Inter-regional and international: STPs can activate their international networks to reinforce the external connectivity of S3;

- Inter-sectoral: STPs can foster linkages and related variety between sectors and clusters where a critical mass already exists.

This creates a new agenda for STPs, which will require the development of sound strategic skills for STP managers. In particular, this involves:

- A vision geared towards economic value creation and innovation ecosystem support, seeing STPs as “smart innovation intermediaries” rather than as real estate managers only;
- The adoption of a long-term perspective in the delivery of services and the definition of priorities in the STP strategy;
- Filling an important gap in terms of monitoring and evaluation of STP actions, seeking to achieve outcomes such as:
 - improvements in the ecosystem that are linked to the STP’s activities;
 - *additional* value creation thanks to “STP effects” (thus taking into account any displacement effects);
 - long-term sustainability and the capacity of attracting private funding for the STP.

Ultimately, when all favourable conditions are met, STPs have the potential to play an important transformative role in regional economies in line with the ambition of smart specialisation strategies.

A critical avenue for further research and experimentation relates to the development of suitable indicators to track the effective contribution of STPs to smart specialisation. This goes much beyond the evaluation of the ‘success’ of STPs according to their own objectives, even if this is the primary point of attention for STP managers and funders. It requires a capacity to understand the additional effects of STPs in terms of generating new knowledge-intensive businesses and lines of activities, as well as the quality of internal and external connections generated by the innovation actors connected to the park.

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Abstract

Science and technology parks (STPs) are very common instruments used by regional and national authorities for regional development. Their main objective is to foster science-based growth poles to stimulate economic diversification away from declining industries. Today, STPs are present in many European regions. They concentrate a wide range of innovative companies and research organisations, and as a consequence the overall knowledge intensity of these places is very high. STPs are thus likely to include seeds for the domains of knowledge-intensive specialisation, on which regions can rely to increase their competitiveness. This is why STPs seem well placed to play a key role in innovation strategies for smart specialisation (S3). We argue that the diversity of STP models by definition means that their contribution to smart specialisation is very likely to depend on the specific context. Three key roles for STPs in the design and implementation of smart specialisation strategies are proposed: (1) STPs may provide an adequate innovation ecosystem for the development of pilot innovation initiatives, well in line with the entrepreneurial discovery process that should drive the regional economies towards new, distinctive and competitive areas of activities. (2) STPs can play an important role as one of the relevant stakeholders forming the quadruple helix of innovation actors shaping smart specialisation strategies. (3) STPs can add the needed external and outward-looking dimension to smart specialisation strategies, a dimension that is today still very much under-developed. Yet, these contributions from STPs cannot be taken for granted. We identify limitations and success conditions for each of the three roles. Illustrative examples of STPs in Finland, England and the Netherlands show how STPs can actively and creatively contribute to the design of innovation strategies and to the external connectivity of their home regions.

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