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Abstract:

Smart Specialisation: Creating Growth through Trans-national cooperation and Value Chains
S3 begins within a region/country by exploiting place-based expertise and industrial skills within the regional innovation eco-system. The paper refers to emerging research which indicates that some regions suffer from insufficient innovation eco-system complexity, followed by sub-optimal innovation performances and path lock-in. This indicates that regional innovation eco-systems could be strengthened through transnational learning and collaboration. The paper suggests that macro-regional and trans-European smart specialisation strategies could be based on multi-level approaches to experimentally extend and strengthen regional innovation eco-systems.

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Executive summary

Policy context

This brief has considered transnational cooperation within the context of smart specialisation. Staying competitive in the global economy depends on transnational activities and participation in global value chains. Transnational collaboration and learning is crucial to achieving economic growth. By 2016, many regions have developed their smart specialisation strategies and related programmes. Traditionally, many national or regional policies and strategies have been developed through intensive in-house analysis and decision-making. However, the increasing complexity of the policymaking context means some European regions do not possess an appropriate capacity to develop complex policies and as a result are not always able to internalise all necessary resources.

Change has occurred in the innovative process from in-house policy development to networked development efforts involving several peers who possess the required policymaking know-how and other critical resources. Transnational learning and peer review played an important role in the early phases of regional level S3 design. As this work now moves into the implementation phase, transnational learning is becoming increasingly crucial not only to S3 design and regional governance but also to enhancing S3 capacity and potential implementation of RIS3. The nature of smart specialisation is experimental. Decisions once made need rethinking. National and regional policymakers in charge of smart specialisation are encouraged to regularly re-examine their own ideas and strategic decisions, as well as improve their work by learning from their own experiences as well as the achievements of others.

Key conclusions

This paper has highlighted a number of important matters in relation to transnational cooperation and S3. S3 begins within a region/country by exploiting place-based expertise and industrial skills within the regional innovation eco-system. The paper suggests that regional innovation eco-systems could be further strengthened through transnational learning and collaboration. Two key forms of transnational cooperation are identified.

The paper suggests that joint (macro-regional and trans-European) strategies could be based on multi-level approaches to experimentally extend and strengthen regional innovation eco-systems. In order to achieve robust and long-lasting outcomes, such initiatives could apply existing S3 tools. Here, an important issue is the transition from temporary programmes, projects and networks to new institutional frameworks for co-evolution and collaboration between smart specialised regions.

The next important step is to exploit the European diversity identified through regional RIS3 strategies while an important long-term challenge is the strengthening of emergent European and macro-regional systems of innovation.

1. Introduction: Creating growth through transnational cooperation

The initial work on the S3 concept and methodology was carried out in 2008 by the Knowledge for Growth group which consisted of policy-makers, professors and innovation experts. By 2016, most regions have developed their smart specialisation strategies and related programmes. Traditionally, many national or regional policies and strategies have been developed through intensive in-house analysis and decision-making. However, the increasing complexity of the policymaking context means some European regions do not possess an appropriate capacity to develop complex policies and as a result are not always able to internalise all necessary resources.

The very concept of smart specialisation can be perceived by some as complex since it deals with a number of somewhat 'contradictory' policy requirements: identifying priorities in a vertical logic (specialisation) while keeping market forces working to identify niches where priorities should be selected (smart). Given this complexity, some policymakers might require further clarification of relevant theoretical and practical issues associated with the concept. Change has occurred in the innovative process from in-house policy development to networked development efforts involving several peers who possess the required policymaking know-how and other critical resources.

Transnational learning and peer review played an important role in the early phases of regional level S3 design. As this work now moves into the implementation phase, transnational learning is becoming increasingly crucial not only to S3 design and regional governance but also to enhancing S3 capacity and potential implementation of RIS3. The nature of smart specialisation is experimental. Decisions once made need rethinking. National and regional policymakers in charge of smart specialisation are encouraged to regularly re-examine their own ideas and strategic decisions, as well as improve their work by learning from their own experiences as well as the achievements of others.

New and existing networks of transnational learning are expected to assist regions throughout the implementation of RIS3. Yet the scope for transnational collaboration goes beyond these policy learning objectives. Such mutual learning activities can further strengthen the knowledge base of regional innovation systems, which in turn would enhance the potential for upgrading products, climbing the value chain, entrepreneurial discoveries, new path development and economic growth (see *Figure 1*). The way forward in promoting entrepreneurial discoveries and creating new paths of development is through transnational collaboration on policy tools, leading to transnational joint strategies of innovation.

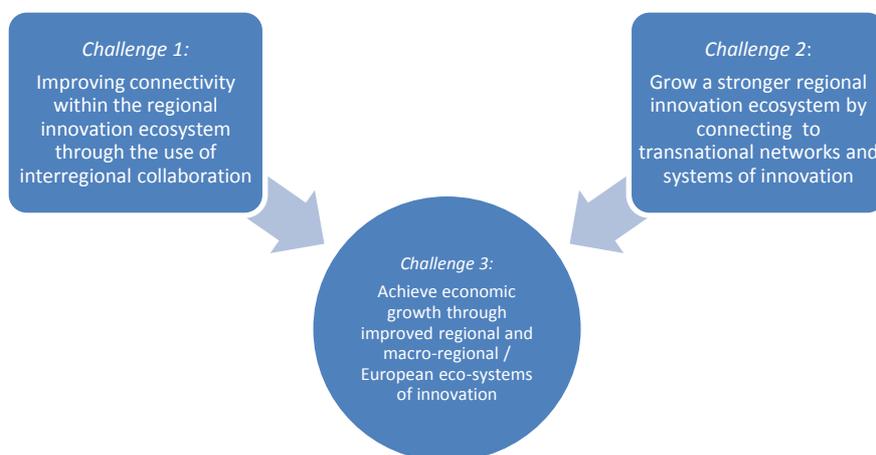


Figure 1: Economic growth through transnational collaboration and learning

2. Creating growth through transnational cooperation

But there can be limits to the effective management of the complexity that large scale outsourcing entails especially when modularity involving design and manufacturing is low. And recently, there have been suggestions around the possibilities of a manufacturing renaissance in those economies which experienced a hollowing out of manufacturing over the past decades.

Smart specialisation starts inside the region, with place-based pre-conditions for growth. Key policy elements which can help examine regions' place-based preconditions for growth include¹ well-connected regional systems of innovation (regional innovation ecosystems), Triple Helix and regional development platforms (see *Figure 2*). Here, a *regional innovation ecosystem* may be seen as a combination of:

- Existing and emerging industrial strengths, represented by the existing industrial capabilities at the core of regional specialisation supported by RIS3.
- Knowledge providers inside the region such as universities, knowledge-intensive enterprises, high-tech service providers, educational institutions, and other centres of expertise.
- Connections between knowledge providers and industrial capabilities inside the region.
- Linkages between various industrial players and knowledge providers inside the region as well as any external (transnational, macro-regional, European or global) networks and systems of innovation, including value chains and business networks.

Regions have widely different eco-systems of innovation²:

- *Innovation leader regions* tend to have highly-diversified industrial structures and several areas and centres of expertise. Knowledge providers and industrial players are generally well-connected inside the region, and tend to have strong links (boundary spanners) to global innovation networks and systems. Core industries in such regions are well-positioned in their value chains, where they have profitable and high value-added functions. They have the capacity to create new paths of development through re-combinations of different, sometimes unrelated forms of knowledge.
- *Specialised regions* tend to have strong industrial sectors that are also well-connected to centres of knowledge and expertise. These regions have a high ability to respond to global market challenges, extend and renew their industrial development paths and lever their industrial strengths to branch out in new, yet related, directions. Generally, their capacity to generate completely new trajectories is limited.
- *Industrial regions* are likely to have efficient industrial sectors that innovate incrementally through learning by doing (DUI). Such regions have either weak or no established centres of expertise inside the region, and as a result have a relatively weak ability to access or link to external networks of expertise (a low absorptive capacity). These regions often find themselves locked into parts of existing value chains in positions which require competing on low costs.

¹ European Commission (2012). Guide to Research and Innovation Strategies for Smart Specialisation (RIS3), Publication Office of the European Union: Luxembourg.

² Isaksen, A. and Trippel, M., (2014). 'Regional industrial path development in different regional innovation systems: A conceptual analysis', *Papers in Innovation Studies* 2014/17, Lund University, CIRCLE. See also: Isaksen, A., (2015). 'Industrial development in thin regions: trapped in path extension?', *Journal of Economic Geography*, 15, issue 3, p. 585-600.

- *Rural regions.* There is a broad variety of rural regions in Europe. Some of these use advanced science-based knowledge in food production, often well-connected to sophisticated and established value chains and knowledge providers. They also tend to have the ability to create new paths of development, through (new) combinations of science and natural resources. Yet many rural regions are somewhat fragmented and find themselves locked into narrow trajectories of development.
- *Peripheral regions.* Centres of expertise and industrial activity in such regions are generally somewhat fragmented and insufficiently developed. Some peripheral regions can lack even basic yet key components of regional systems of innovation.

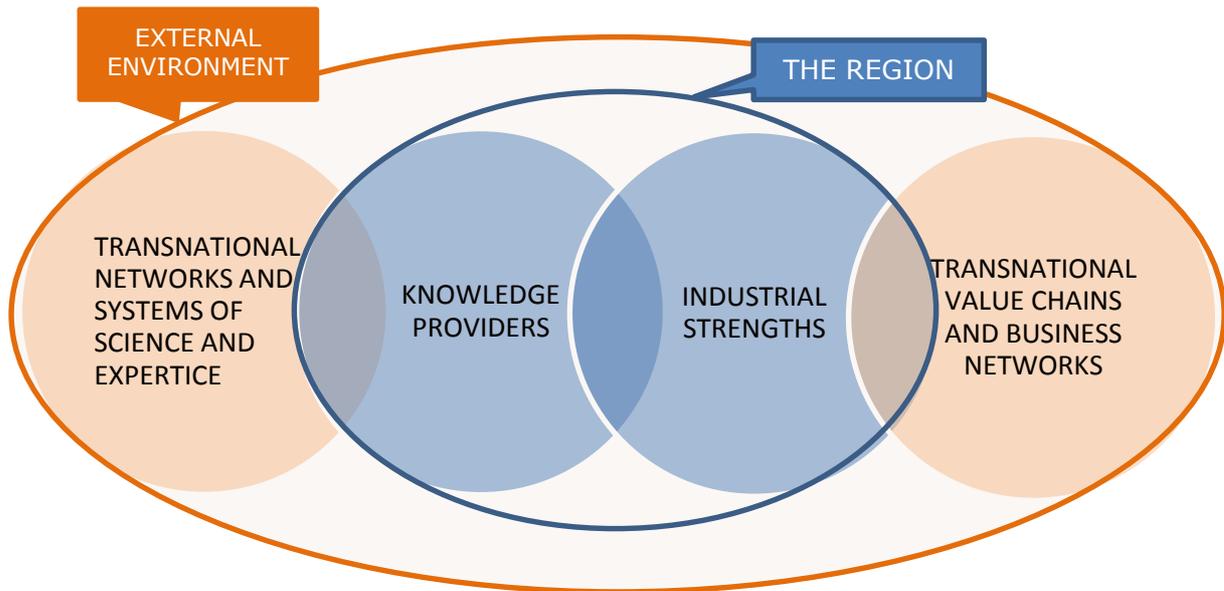


Figure 2: Regional innovation ecosystem and its external environment

To be able to diversify and/or identify new development trajectories (through a series of entrepreneurial discovery processes), regions may need to acquire access to new forms of knowledge, create new re-combinations of their resources, and move from path extension to new path-creation.

Policy must recognise³ the need for international interfaces, while simultaneously ensuring that knowledge accumulates domestically and filters out into the economy for re-use, recombination and experimentation. All this calls for dynamic innovation policies continuously balancing between incentives for the build-up and use of internal knowledge resources (i.e. intramural (R&D)), and incentives for external search, collaboration and sourcing. The latter, in turn, must balance between domestic linkages, broadly-defined, and international linkages.

It can be argued that RIS institutions should act as *mediators for local knowledge diffusion between global network nodes and regional resource bases.* Such pro-active

³ Herstad, S., Bloch, C., Ebersberger, B. and van de Velde, E., (2008). 'Open innovation and globalisation: Theory, evidence and policy implications', Vision EraNet project report.

use of transnational networks can help diversify the regional knowledge base and system of innovation⁴.

Furthermore, regional ecosystems of innovation should not remain closed to external participation. On the contrary, in order to become more dynamic and diversified, these regional innovation ecosystems should be strengthened by opening up and strengthening wider knowledge networks including scientific networks that strengthen centres of expertise and business networks providing regional access to leading global technologies. Such intentional extension of knowledge networks beyond the region can be linked to the overall framework of a regional strategy as shown in *Table 1* below. Knowledge networks and strategy may be multi-dimensional and include place-based regional systems of innovation linked to transnational knowledge networks and levels of strategy.

Table 1: New path-creation through multi-level strategies and networks

		LEVEL OF STRATEGY	
		Regional	Transnational
KNOWLEDGE NETWORKS	Regional	Place-based development based on regional system of innovation	Path extension – transnational learning
	Transnational	Path extension Climbing in value chains	New path-creation based on transnational and macro-regional innovation ecosystems a networks

For instance, a regional ambition to move up the value chains (*discussed below*) may be seen as a path extension strategy assisted by transnational networks. However, extending knowledge networks can also be seen as a part of a joint (transnational or macro-regional) innovation strategy. Such transnational innovation strategies could allow partners to take advantage of the European regional diversity as a group of regions could develop strategies based on co-evolution and complementarity. Such a collaborative approach to policymaking can be expected to boost the critical mass and knowledge complexity while further supporting ongoing entrepreneurial discoveries in various types of regions. Furthermore, it could also contribute to strengthening innovation systems and networks at European level.

3. Transnational cooperation and learning tools

There is a range of transnational cooperation and learning tools which can be applied to achieve the move towards transnational RIS3, including the S3 Platform's tools, Territorial Cooperation Programmes, Horizon 2020, COSME and other EU programmes and instruments.

Furthermore, the regulatory ESIF framework explicitly supports transnational cooperation activities. A number of changes introduced in the 2014-2020 programming

⁴ Herstad, S. J. and Ebersberger, B., (2015). On the link between urban location and the involvement of knowledge-intensive business services firms in collaboration networks. *Regional Studies*, 49(7), 1-16.

period allow for spending support from the ESIF outside the programme area in other EU countries, thus creating new possibilities for synergetic use of EU funds⁵. Derogations in Article 70(2) of Common Provisions Regulation for ESIF 2014-2020⁶ stipulate the possibility of spending up to 15% of the support from the ERDF, Cohesion Fund and EMFF at priority level (up to 5% of the support from the EAFRD at programme level). Article 13(3) of the ESF Regulation⁷ allows that up to 3% of the budget of an ESF operational programme can be allocated to operations located outside the programme area.

3.1. The European Commission's S3 Platform and its community of practice

In 2011, the European Commission (EC) launched its Smart Specialisation Platform⁸. This facility was put in place to help European regions and Member States to develop, implement, and review research and innovation strategies based on the principle of smart specialisation.

A common transnational frame of reference ('S3 Language')

The importance of a common transnational '*language*' or a shared conceptual frame of reference has been generally suggested by S3 planners and policymakers across the EU. Having a shared understanding of important concepts, models and related terminology helps overcome many initial obstacles for efficient transnational collaboration between regions. In the context of smart specialisation, many transnational cooperation efforts focus on a collective search for new ways of dealing with common challenges, testing these in real-life situations and transferring innovative approaches to new contexts. In addition, many collaborative efforts involve processes of knowledge transfer, development, lesson-drawing and mutual learning. Earlier experiences suggest that successful policy transfers often rely⁹ on a combination of purposely-developed tools and extended processes of 'translation'.

The '*S3 language*' was initially developed through the preparation and publication of the European Commission's RIS3 Guide. Its further dissemination took place through national, regional and transnational conferences as well as peer reviews organised by the European Commission. It has been suggested that the motives behind the policymakers' decision to be peer-reviewed by their international counterparts include *knowledge and information sharing, learning together, policy dialogue, as well as advocacy, compliance and transparency*¹⁰. As a result, many European regions and Member States viewed the S3 Platform as a very timely venue for learning about the latest policy developments in other regions.

Since 2012, many policymakers from across the Union continue to see it as a forum that allows the search for both formal and/or informal advice and feedback on specific policy

⁵ http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf

⁶ Regulation (EU) N°1303/2013 of the EP and of the Council of 17/12/2013- OJ L 347/320 of 20.12.2013

⁷ Regulation (EU) N°1304/2013 of the EP and of the Council of 17/12/2013- OJ L 347/470 of 20.12.2013

⁸ <http://s3platform.jrc.ec.europa.eu>

⁹ Mariussen, A. and Virkkala, S., (2013). Learning Transnational Learning, Routledge.

¹⁰ Rakhmatullin, R., (2014). Examining the use of peer review in the development of regional research and innovation strategies for smart specialization. Triple Helix Association Magazine Hélice Issue 8. 3/2014.

issues from their peers in other parts of Europe. Accumulatively, the work carried out by the S3 Platform led to the creation of a 'community of S3 practice' with a shared understanding of the smart specialisation concept and principles, as well as of appropriate advanced development and implementation strategy tools. The shared framework developed for and with this 'community of S3 practice' allows for deeper transnational learning, an ongoing exchange of experiences between policymakers in charge of smart specialisation across the EU.

S3 Peer Review Methodology

If some regions have been quick to advance in the development of original RIS3 strategies, others found it more challenging to focus on clear priorities. To address this divide, the S3 Platform team has developed and implemented a peer review methodology¹¹ to assess the smart specialisation strategies drafted by regions. Within the context of this peer review approach¹², workshops bring together regions with a common goal of facilitating mutual learning around specific policy-related issues, and exploring the ways in which RIS3 strategies can be further improved. These events organised by the S3 Platform have two principles. The first is to allow regions to meet their peers from other regions and countries, the EC staff, and academic and industry experts, to discuss common issues related to the smart specialisation approach. The second component is to allow European regions to review each other's work on RIS3 in an open and trusted learning environment.

PXL Methodology

Peer eXchange and Learning (PXL) is a methodology¹³ for reviewing specific elements of innovation strategies for smart specialisation and territorial development strategies, as well as tackling the associated implementation challenges. PXL aims at addressing the challenges that have emerged from the strategy design stage to the implementation phase. It is an important instrument offered by the S3 Platform of the European Commission to EU Member States and regions. PXL builds on the well-established peer-review approach of the S3 Platform. It supports transnational learning by bringing together regions and countries for knowledge and experience exchange, and the exploration of ways in which innovation and development strategies can be effectively implemented, adjusted and revised.

3.2. Stages and instruments of transnational cooperation in S3

Regional innovation eco-systems determine the degree of intensiveness of collaboration. S3 cooperation may begin on a bottom-up basis involving exchange of data and information, and then move on to experiment with collaborative projects and, later on, evolving into strategic platforms and alignment of funding instruments allowing for a comprehensive policy approach opening up joint programmes and a combination of policy tools. This evolution of transnational cooperation in S3 from mutual information to common strategy may be explained like a stair where each step opens up for the next, although some might be missed but continuous efforts and successful partnerships help to build a solid background for joint transnational strategies.

¹¹ Rakhmatullin, R., Midtkandal, I., (2014). The S3 Platform Peer Review Methodology. S3 Working Paper Series, No. 02/2014. European Commission.

¹² <http://s3platform.jrc.ec.europa.eu/s3-design-peer-review>

¹³ <http://s3platform.jrc.ec.europa.eu/s3-implementation-pxl>

The evolution of transnational collaboration from shared information to joint strategies:

- Shared/mutual information, good practice sharing;
- Experimentation with policy learning and transfer of good practice from other regions;
- Opening the programmes for external partners;
- Alignment of policies in specific areas and joint actions;
- Forming strategic platforms for a continuous pipeline of joint actions and projects; and
- Joint strategies (cross-border, inter-regional, transnational, macro-regional).

Aligning R&I goals and priorities into a joint smart specialisation strategy, regions expect to better attract competitive R&I funding frameworks as in the example below of the joint cross-border smart specialisation strategy of the Galicia region in Spain and Northern Portuguese region (see *Box 1 below*). Various forms of transnational cooperation may be relevant for different phases in S3 planning and implementation. The form of collaboration which is most directly linked to the extension of the regional development platform is integration of policy tools during S3 implementation¹⁴.

Box 1: Galicia (ES) and Norte (PT) - Joint cross-border smart specialisation strategy

In order to make better use of the different funding frameworks, in particular regional operational programmes and cross-border cooperation, the funding regional authorities of Galicia (ES) and Norte (PT) in 2014 began a joint strategic process with the creation of the cross-border Working Group (Technical Secretariat) made up of representatives from the Galician Innovation Agency (GAIN) and the Northern Portuguese Regional Coordination and Development Commission. They set up the governance for the development of a joint strategy and carried out an analysis which identified the main areas for collaboration between the two entities. At the end of this strategic exercise, a shared vision for the future was created that includes the alignment of R&I goals and the proposal of joint priorities, actions for support, as well as an evaluation system with indicators to follow up implementation. The joint S3 aims at reaching greater levels of critical mass based on innovation synergies and complementarities at value chain level, given the increasing combination of knowledge and production capabilities needed in innovative processes.

Table 2 below indicates some of the major areas of cooperation and their relation to the phases of S3 planning.

¹⁴ Uyarra, E., Sörvik, J. and Midtkandal, I., (2014). Inter-regional collaboration in research and innovation strategies for smart specialisation (RIS3), S3 Working Paper Series No 06/2014.

Table 2: Aligning transnational collaboration instruments with RIS3 steps

RIS3 stage	Which partners?	Policy Tools	Examples
 <p>Analysis, Monitoring, Evaluation</p>	<ul style="list-style-type: none"> - Learn from good practice. - Start transnational policy-learning by discovering your differences. - Look out for good practice in other regions which generate a level of innovation higher than what you are currently able to achieve. 	<ul style="list-style-type: none"> • Evaluation of R&I policies • Good practice transfers • Peer reviews¹⁵ • Benchmarking¹⁶ • Foresight 	<p>INTERREG IVC KNOWHUB project (PL, HU, ES, FR, AT, DE, BG) helped to bridge the gap of knowledge, skills and experience in designing and implementing RIS3 through joint activities. http://www.know-hub.eu</p> <p>INTERREG IVC TR3S project (FI, DE, PL, RO, IT, EE, UK, HU, ES) identified the unique characteristics and assets of each region highlighting their competitive advantages through mutual learning and exchange of experiences. http://www.tr3s-project.eu</p>
 <p>Design, visions, priorities, governance</p>	<ul style="list-style-type: none"> - Learn from your peers, identify regions with structural conditions and problems which are similar to your own. - Structural differences may lead to policy methods which cannot easily be transferred. 	<ul style="list-style-type: none"> • Evaluation of R&I policies • Cluster policies • Joint platforms for dialogue • Coordination of R&I policies • Cross-border R&I strategies 	<p>INTERREG Europe CLUSTERIX 2.0 project is an ongoing effort of 10 regions/countries on leveraging cluster policies for the successful S3 implementation, aiming to improve policy tools related to the delivery of innovation, making better use of clusters to facilitate such processes by focusing on complementary competences through the introduction of new innovation models for the development and operational implementation of strategic cluster partnerships. http://www.interregeurope.eu</p>
 <p>Implementation policy mix</p>	<ul style="list-style-type: none"> - Some regions may have performed better than others in terms of knowledge-creation, innovation and growth. - Consider linking into their knowledge & innovation networks; build on complementarities through deeper integration into transnational value chains and knowledge networks. - 'Building bridges' can provide absorptive capacities and spaces for knowledge brokers. 	<ul style="list-style-type: none"> • Potential cross-border and Joint European and macro-regional RIS3 strategies • Joint research and education programmes • Joint provision of R&I infrastructure • Collaborative schemes to support R&I investment, technology transfer infrastructure • Joint Innovation support services and facilitating access to finance • Selection criteria to encouraging transnationality in calls for projects. 	<p>Swedish Agency for Economic and Regional Growth (Tillväxtverket) opened an ERDF-financed cross-clustering scheme to strengthen regional and national efforts developing new knowledge and competencies. Its purpose is to stimulate cross-border collaboration, between regions and countries, to support S3 projects based on Swedish-prioritised areas of strength for their further development and renewal. In 2015, the call for pre-studies was launched for inter-regional cluster collaboration projects. In the next stage the most promising 5-8 collaboration projects involving international partners will be granted support up to €1 million for 3 years in order to develop and renew the Swedish areas of strength. http://www.tillvaxtverket.se</p>

¹⁵ <http://s3platform.jrc.ec.europa.eu/s3-design-peer-review>

¹⁶ <http://s3platform.jrc.ec.europa.eu/regional-benchmarking>

3.3. S3 Tools for selection of partner regions

As transnational learning and collaboration take an ever more central role during the S3 implementation phase, policymakers work on the identification of potential partner regions across the Union. A key to building sound regional innovation strategies for smart specialisation is linked to being able to recognise opportunities for learning policy lessons and transferring practices from other regions. The selection of partners is never easy, as several factors and preconditions for learning must be taken into consideration (see *Table 2*). What are the regions one could consider as a reference for these purposes? To guide policymakers in this work, the S3 Platform has put in place a number of tools.

Regional Benchmarking Tool

This is an interactive tool¹⁷ for Regional Benchmarking which helps identify structurally similar regions across Europe. The tool has been developed by the S3 Platform in collaboration with Orkestra – the Basque Institute of Competitiveness. The tool allows for the identification of regions that share similar structural conditions which are relevant for innovation-driven development (social, economic, technological, institutional and geographical characteristics). That is, characteristics that cannot be easily changed in the short-term and that are demonstrated to affect how innovation and economic evolution take place in a given region.

Eye@RIS3 Database

The Eye@RIS3 is an online database¹⁸ of RIS3 priorities. Data on envisaged priorities come from several sources ranging from RIS3 strategies, peer review workshops and expert assessment reports that have been added to the database by the S3 Platform. Furthermore, the database also includes contributions from regions that have uploaded their planned priorities. The purpose of the database is to offer an overview of regional and national RIS3 priorities in order to enable regions to position themselves, find their unique niches and seek out potential partners for collaboration.

EU Trade Tool

This is a fully interactive web-based application¹⁹ for the visualisation of inter-regional trade flows and the analysis of regions' competitive position of regions. The purpose of this tool is to make it possible to assess regional assets and analyse the region's economic position as a first fundamental step in the process of building place- and evidence-based regional policies and smart specialisation strategies. The *competition maps* show which regions, and within that which areas, compete internationally with a region under examination. Competition here is defined as the degree of trade networks overlapping with those of their competitors. By investigating this market overlap, we can discover which markets are most important for firms and which regions are strong performers (and potential competitors) in these areas. The major international competitors differ per region and even per sector within each region. This is caused by the differences in market overlap per region and sector. This calls for a careful evaluation of place-based policies of regional, national and European governments based on revealed competition benchmarking. In revealed competition benchmarking these (sectors within) regions are only compared with their actual competing regions.

¹⁷ <http://s3platform.jrc.ec.europa.eu/regional-benchmarking>

¹⁸ <http://s3platform.jrc.ec.europa.eu/eye-ris3>

¹⁹ <http://s3platform.jrc.ec.europa.eu/s3-trade-tool>

ICT Monitoring Tool

This web-based tool²⁰ allows for the search of European Structural and Investment Funds (ESIF) data (ERDF, CF, ESF, YEI and EAFRD) on planned investments in ICT. The tool contains data from the ESIF Operational Programmes (OP) on planned ICT-related investments. The SFC platform from which the data is retrieved is a management tool for ESIF-managing authorities (MA) at national and regional level and the four ESIF managing DGs (REGIO, EMPL, AGRI, MARE). The data are entered by MA, verified by DGs and if needed corrected by the MA.

The amounts in this tool are presented at regional level and include data from regional OPS, but also shares of national and transnational cooperation programmes. The shares have been estimated by taking into account the population size of the regions and their development stage. Data depicted here are thus estimations of potential investments and do not reflect final investment figures.

4. Main challenges and ways to overcome these

Depending on the level of internationalisation of innovation systems described in *section 2*, three main challenges can be identified:

- *Challenge 1:* Develop a stronger place-based regional innovation eco-system through improved internal connectivity between existing industrial and knowledge provision strengths. The S3 analysis, design and governance are supported by transnational learning.
- *Challenge 2:* Grow a larger, stronger and more dynamic regional innovation eco-system by opening it up and connecting it to macro-regional and European knowledge networks and systems of innovation.
- *Challenge 3:* Create economic growth through innovation expanding across borders. By integration of the regional innovation system (challenge 1) and expanding it through better access to transnational networks and systems of innovation (challenge 2) the innovative ability of the eco-system is expected to increase. This extension may enable collaboration on wider transnational and macro-regional strategic frameworks.

4.1. Challenge 1: How can transnational cooperation help to design and implement smart specialisation strategy inside the region?

The European Commission's RIS3 Guide and the framework of Structural Fund mechanisms define a number of requirements and suggestions as to which governance mechanisms and structures could be put in place. However, it is important to keep in mind that there are apparent path dependencies between some pre-existing regional governance institutions and S3 governance structures. As a result, there is a range of ways to design and govern S3 strategies in terms of which actors are in charge, their roles and responsibilities, the scope of these strategies, as well as the focus of the analysis supporting them. This variety can be seen as a strength, as it reflects the ability of the S3 community to '*adapt and adopt the message*' in very different regional contexts. At the same time, it can also create lock-in problems. The decisions about design and governance help to understand what is to come later during the

²⁰ <http://s3platform.jrc.ec.europa.eu/ict-monitoring>

implementation phase and to establish feedback loops between these two phases. Smart specialisation problem-solving is to a large extent a multi-level phenomenon where the focus of the analysis, including the granularity of the problem, may change over time. This dynamic environment presents a recognised challenge to putting in place a stable governance mechanism.

Implementation of smart specialisation strategies within a region should not be seen as a static planned, top-down process. It is not based on a rigid application of an equally static set of policy tools, decided once and for all at the beginning of the planning cycle. Neither should it be perceived as an incremental process of implementation, with no long-term vision. The S3 implementation phase can be seen as an experimental '*trial and error*' process (see Figure 3). During this experiment, design, visions and long-term goals are regarded as hypotheses which can be confirmed as well as rejected during the implementation and monitoring of effects on the regional innovation ecosystem.

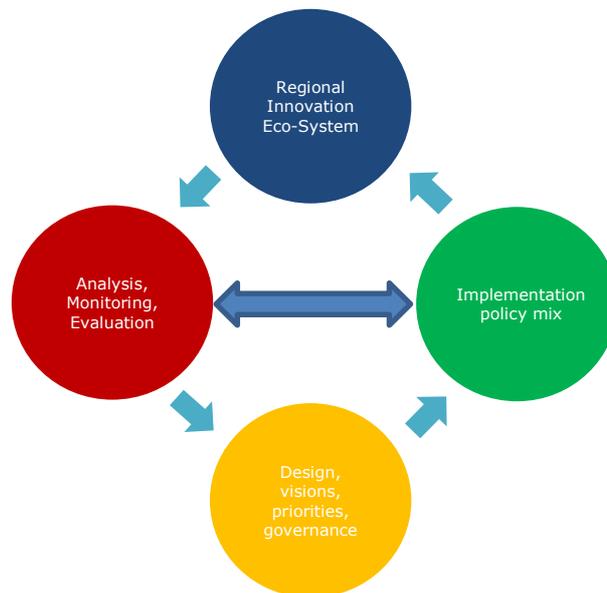


Figure 3: S3 implementation as a continuous learning process

This suggests a need for built-in *feedback loops* connecting different process elements: implementation, actual impacts on the regional innovation ecosystem (to be observed through monitoring and evaluation), the analysis of the S3 strategy, as well as design and governance mechanisms. Regional innovation eco-systems (often structured around two main nodes: academia and industry/businesses) can be somewhat fragmented in some regions. This fragmentation could be linked to a potentially critical triple helix (TH) gap. Addressing this gap would generally require significant concerted efforts to re-connect various actors across regional innovation ecosystems.

In some regions, there is a long history of co-evolution between universities and industry. They tend to co-evolve by relying on one another's successes and achievements. Industry and academia are often connected through regional labour markets and supported through the increasing mobility of experts and professors. In other regions, academia and industry are distinctly different worlds with different rules, linked into widely different knowledge networks. In such regions, universities are particularly well linked to global scientific communities, yet their contribution to regional development is more limited.

Addressing these mismatches through a triple-helix dialogue may contribute to a shared understanding of different stakeholder needs (see Box 2).

Box 2: Application of a gap analysis tool developed in Ostrobothnia by the region of Nordland

Nordland is an industrial region in Norway with inadequately developed knowledge providers, characterised by a high level of path dependency and learning by doing (DUI) innovations. The regional authorities in charge of RIS3 searched for good practice which could be used to build a regional system of innovation for the Norwegian manufacturing industry. They have identified the Ostrobothnian model of Triple Helix analysis and policymaking, a smart specialisation planning tool initially developed and applied in Ostrobothnia (Finland). This good practice was later applied during the analytical stage of the S3 process in Nordland. Interestingly, this transnational learning exercise in turn helped the region of Ostrobothnia to realise its core strengths and build these into its RIS3.

4.2. Challenge 2: Strengthening a regional innovation eco-system by opening it up and connecting to macro-regional and European knowledge networks

The importance of the global economy and innovation networks calls²¹ for a regional innovation policy that goes beyond regional and national borders. Collaborating in S3 countries/regions combines complementary strengths, exploits their competences in R&I, get necessary research capacity, overcome any lack of critical mass as well as fragmentation and access to global value chains.

One driver behind transnational and inter-regional collaboration in the S3 context relates an attempt to overcome the lack of public investment for R&I, while trying to align various S3 agendas through joint S3 initiatives in order to overcome capability failures hindering innovation. Furthermore, transnational cooperation can be used to source new ideas, innovative approaches and skills. It can facilitate transfer of knowledge and capabilities and facilitate learning processes.

Regional authorities can address this challenge by connecting their regional innovation ecosystem with relevant actors outside the region by exploring opportunities across three key dimensions:

1. Emerging European and macro-regional networks and innovation eco-systems
2. Global, European, and macro regional value chains and business networks
3. New opportunities for entrepreneurial discoveries, exploiting the new possibilities created by the extension.

To be able to utilise these opportunities adequately, regional authorities might start by re-examining their existing regional development programmes, smart specialisation strategy and continuous analysis of the current regional innovation ecosystem.

- How can this ecosystem of innovation be improved, and what vision of innovation could emerge from these improvements?
- Is it necessary to reinforce the system in order to boost entrepreneurial discoveries?

²¹ Uyarra, E., Sörvik, J. and Midtkandal, I., (2014). Inter-regional collaboration in research and innovation strategies for smart specialisation (RIS3). *S3 Working Paper Series*. No 06/2014.

- Is there a need for new path-creation or path-renewal which cannot be met with the existing resources of the region?

Answers to these questions could help regional policymakers to identify their potential transnational partners. Below are additional criteria that could guide them further in this work:

- Who can help you to provide the knowledge you do not have?
- Do you have the capacity in your eco-system to establish these networks with the other potential partner, and how?
- If so, you could start to work on policy-instrument cooperation.
- Macro regions may also enable broader collaboration (beyond cooperation on policy tools) in the direction of alignment of strategies and even development of common strategies at macro-regional and European level

The example below (see *Box 3*) demonstrates how transnational learning and comparative analysis and the sharing of entrepreneurial discovery process outcomes helped regions to find new strategic interests in the field of ICT.

Box 3: Lorraine (FR) and Tuscany (IT) – Gains from transnational collaboration when exploring cross-sectorial ICT opportunities in S3

INTERREG IVC project BORDWIIS+ (<http://www.bordwiis.eu>) tackled the challenge of providing policymakers with recommendations about the manner in which ICT development can be exploited within smart specialisation strategies. The project succeeded in influencing several S3 within the participating regions.

For instance, the Lorraine region in France focused its innovation strategy on already well-established economic sectors (materials, bio-medicine, energy and resources). Thanks to the project, the region finally integrated digital sciences and the needs of the markets linked to ICTs in its strategy. The exchanges carried out within the framework of BORDWIIS+ enabled Lorraine to identify its assets (and weaknesses) more precisely and develop a robust meta-project based on ICT innovation.

Similarly, the lessons learned during the experience exchange directly affected the process of defining S3 in Tuscany (IT). The study visits and comparative analysis among partners were useful to better understand Tuscany's position internationally with regard to ICT. During the entrepreneurial discovery process and on the basis of the project's comparative analysis, 'Photonics for space and medical applications' was identified as the most important R&D field. As a result, Tuscany included photonics solution into the domains of aerospace and medical applications in its S3 final version.

Macro-Regional Strategies and Smart Specialisation

'*Macro-regional strategies*' are integrated frameworks endorsed by the European Council which aim to address common challenges faced by a defined geographical area relating to EU MS and other countries located in the same geographical area²². These countries are then expected to benefit from increased levels of cooperation leading to the achievement of greater economic, social and territorial cohesion. To date, the European Union has put in place strategies for a number of such macro-regions covering several policies: the Baltic Sea Region, the Danube Region, the Adriatic and Ionian Region, and the Alpine Region.

²² http://ec.europa.eu/regional_policy/lt/policy/cooperation/macro-regional-strategies

Macro-regional strategies emphasise greater co-ordination between stakeholders and the alignment of resources and strategies between actors of different governance levels which is very important for the successful implementation of RIS3. Macro-regional initiatives promote and enable macro-regional governance mechanisms which allow for the sharing and integration of knowledge/industrial resources. By participating in macro-regional strategies, regional and national policymakers have an opportunity to:

- Discuss the transnational dimension of RIS3, its importance, relevance, practical issues;
- Learn about available analytical tools and implementation instruments, including value chain activities through cross-cluster and cross-region cooperation;
- Examine various cooperation opportunities and steps to be taken in order to stimulate transnational cooperation on areas of smart specialisation;
- Explore common interests and set up collaborative projects.
- Jointly consider how to mobilise relevant funding sources that will support their projects.
- Provide more appropriate common or coordinated replies to global issues, and thus increase the competitiveness of the macro-region.

Cooperation in S3 at macro-regional level helps to explore as to whether and how the proposed RIS3 priorities differentiate from, or are complementary to, the neighbour countries/regions and to avoid imitation. It leads to creating strategic linkages to tackle common challenges when engaging in joint S3 initiatives and projects (see *Box 4*).

Box 4: The EUSBSR flagship project - BSR Stars programme

The BSR Stars (<http://www.bsrstars.se>) is a transnational programme and policy collaboration among 10 countries (DK, EE, FI, DE, LV, LT, NO, IS, PL, SE) aiming at strengthening competitiveness and economic growth in the Baltic Sea Region created a platform for projects linking smart domains and fostering transnational linkages between specialised research and innovation nodes, leading to strategic innovation alliances to tackle common 'grand challenges', such as health, energy, sustainable transport, and digital business and services .

One of the recent initiatives in the flagship, BSR Stars S3 is an INTERREG BSR project which fosters a transnational approach towards RIS3 implementation. Partners (DK, FI, LT, NO, SE) will develop integrated innovation support infrastructures, such as test and demonstration facilities and new innovation management tools to leverage complementary competences stemming from their RIS3. <http://www.baltic.org/project/bsr-stars-s3>

Regional S3 strategies could be aligned at macro-regional level along the four dimensions of analysis/monitoring, design/governance, implementation/policy mix and improvements within the eco-system (see Figure 4 below).

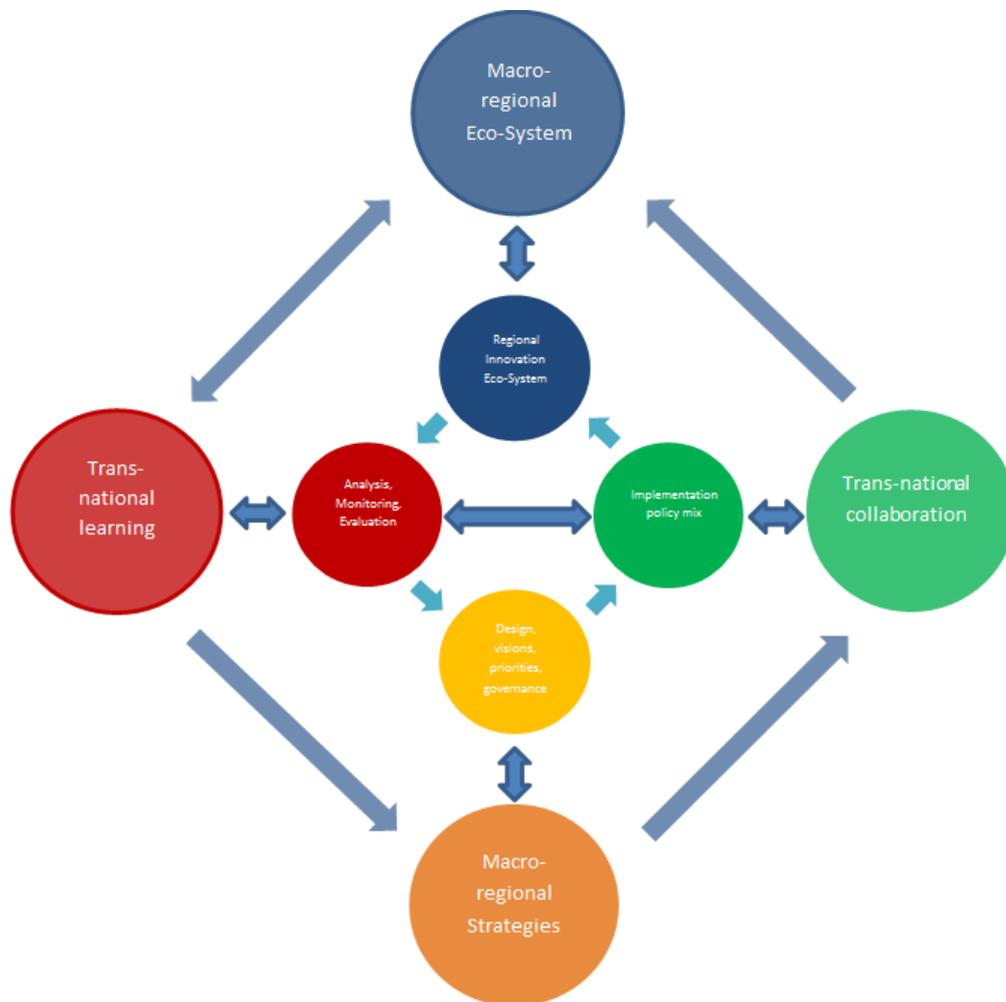


Figure 4: Reinforcing development platforms through emerging multi-level RIS3

4.3. Challenge 3: Using transnational connections to create economic growth through innovation

Economic growth can be facilitated through technological innovation, leading to new path-creation. The next technological revolution will depend upon multiple innovations across many industrial areas linked to emerging value chains with several technological components, joined in new ways. This is where European macro-regional diversity may contribute: some regions have access to leading R&D and upstream innovation facilities, other regions have industrial skills needed in downstream testing and industrial upscaling – and macro regions may even have both. It is time to upgrade transnational networks of knowledge and expertise, and drive the development of trans-national and macro-regional value chains.

Global value chains and smart specialisation

Global value chains (GVCs) are 'organisational systems'²³ that operate across multiple nations that are integrated and whose technology base, or 'engine', is Information & Communication Technologies (ICT). Thus consistent with the role of ICT and related key enabling technologies (KETs) as a means of upgrading activities in some sectors within countries/regions, they can also play an important role in GVC participation. GVCs drive firm-level competitive advantage through integrating global and local competitive and comparative advantages (firm- and location-specific advantages).

The comparative advantage of the industry can be assessed and its degree of participation within the industry GVC can be examined, including establishing those locations that serve as its main sources of input and the destinations of its output. Thus the linkages of the industry and their extent can be established. Such an analysis could point to opportunities for maintaining, extending and/or deepening the region's positioning on the GVC.

Furthermore, by applying a similar analysis to other locations, a region (or country) can ascertain others that occupy significant parts of the industry value chain, how strong their positions are and whether those clusters of GVC activity are similar/complementary to their own. Taking account of previously-identified linkages, this can indicate whether there could be opportunities to capitalise on complementarities in other locations, and the development of inter-/macro-regional and trans-European linkages.

Since the data required at the digging stage may be unavailable or indeed difficult to access, it is necessary to identify conduits/boundary spanners that are connected to the industry and have a deep knowledge of the industry cluster and its characteristics. These spanners are likely to be found within national and regional development agencies and/or enterprise development agencies. For each location, such individuals might be assigned specific S3 responsibilities within the context of the industry GVC. Platforms – real and virtual – would need to be developed to facilitate engagement among such conduits/boundary spanners so that opportunities for intra-regional industry GVC linkages can be precisely identified and pursued, and that match-making takes place.

A number of general principles can be summarised as Engaging, Anticipating, Assessing and Responding (EAAR):

- I. *Engaging* with the industry and its stakeholders on a continuous basis,
- II. *Anticipating* the likely evolution of the industry globally,
- III. *Assessing* the challenges and opportunities that are likely to ensue from future industry trajectories, and
- IV. *Responding* to those challenges and opportunities in a proactive manner.

²³ L. Brennan, R. Rakhmatullin, 2015; Global Value Chains and Smart Specialisation Strategy. Thematic Work on the Understanding of Global Value Chains and their Analysis within the Context of Smart Specialisation; EUR 27649 EN; doi:10.2791/44840

A good example of such a trajectory of position upgrading within a value chain is the case of BioPharma in Ireland (see *Box 5 below*).

Box 5: The Case of Ireland's BioPharma

The Pharmaceutical industry forms an important part of the manufacturing sector in the Irish economy. Initial investments in the sector were primarily in bulk pharmaceuticals, now known as active pharmaceutical ingredients (APIs). Over the course of the 1970s, investment began to gravitate towards drug product manufacture. The 1990s saw this trend continue, with many established sites reinvesting significantly and expanding into shared service activities. The advent of the human genome project saw many Ireland-based companies invest in biotech or biopharmaceutical operations. Currently, many players are investing in product and process development, thereby adopting the Development & Manufacturing model. In addition, a number of indigenous specialist pharmaceutical and chemical companies have been established, adding to the overall diversity of the sector. The majority of Irish sites have undergone significant transformation since they were first established. This has helped the country to move away from its traditional status as a sourcing location, primarily for APIs. Many sites are now engaging in fully-integrated operations, offering a range of activities beyond pure manufacturing, including process and product development, manufacture for clinical trials, shared services, etc.

For more information about this case, please see: *L. Brennan, R. Rakhmatullin, 2015; Global Value Chains and Smart Specialisation Strategy. Thematic Work on the Understanding of Global Value Chains and their Analysis within the Context of Smart Specialisation.*

The process of Engaging, Anticipating, Assessing and Responding (EAAR) is required to be followed on an on-going basis and must involve active stakeholder participation. The following are areas that are key for the development of regional position in global value chains:

- I. The provision of a compatible and supportive environment via a relevant infrastructure that encompasses a robust regulatory framework, research and technology and education.
- II. The upgrading and sustaining of a regional/national innovation system.
- III. The development of the requisite human capital pool.
- IV. The supporting and nurturing of collaboration among all stakeholders.
- V. The engagement in the upgrading of existing activities within industry.
- VI. The anticipating and targeting of areas of growth within the industry.

If regional authorities are to play a role in co-creating and developing European industrial value chains based on smart specialisation priorities, they would also need to focus on the following: interregional knowledge-building, mapping the matchmaking potential around GVCs between regional smart specialisation priorities, identifying some pilot examples of interregional value chains, key stakeholders, available equipment and facilities and relevant actors/skills in smart specialisation areas and applying the methodology described above with a view to identifying opportunities for matching national and regional cluster organisations in identified value chains of smart specialisation areas.

The Vanguard Initiative (*see Box 6 below*) is an example of ongoing multi-regional collaboration in bringing together regional eco-systems in a number of key priority areas

such as Advanced Manufacturing. The initiative is committed²⁴ to embedding clusters or cluster-like organisations (co-creating eco-systems for public private partnerships in innovation and transformation) in regional eco-systems as the backbone of new emerging cross-EU and cross-sectoral innovative value chains.

Box 6: The Vanguard Initiative and related activities

The smart specialisation Vanguard Initiative (<http://www.s3vanguardinitiative.eu>) seeks to lead by example in developing interregional cooperation and multi-level governance for supporting clusters and regional eco-systems to focus on smart specialisations in a number of priority areas for transforming and emerging industries. These regions wish to build synergies and benefit from complementarities in smart specialisation strategies to boost world-class clusters and cluster networks, in particular through pilots and large scale demonstrators. These investments will bolster the competitive capacity of Europe to lead in new industries for the future and develop lead-markets that offer solutions for our common challenges. The sectors covered by the Vanguard Initiative are: Advanced Manufacturing for Energy Related Applications in Harsh Environments, High Performance Production with 3D Printing Efficient and Sustainable Manufacturing Bio-based Economy and Nanotechnology. The Vanguard Initiative builds on the Milan declaration.

In the framework of smart specialisation strategies, regional policy and governments can play a key role in modernising EU Industry. To get a higher impact, these efforts can be further facilitated at EU level to allow a combination of different competences and assets that are today available across the Union. This has been confirmed in the Communication '*For a European Industrial Renaissance*' adopted in 2014 that proposed '*to combine regional and industrial policy tools to create [Thematic] Smart Specialisation Platforms to help regions roll out smart specialisation programmes by facilitating contacts between firms and clusters, enabling access to the innovative technologies and market opportunities*'. To achieve this, an integrated approach is necessary to ensure strong involvement of industry in the implementation of smart specialisation strategies and intensify cross-regional cooperation with a particular focus on making better use of clusters and fostering industrial modernisation.

The ultimate objective is to facilitate concrete cross-regional innovation that could be supported through the European Structural and Investment Funds, Horizon2020, COSME and European Fund for Strategic Investments (EFSI). As of June 2016, the European Commission services have launched three thematic smart specialisation platforms (TSSP) on Agri-Food²⁵, Energy²⁶ and Industrial Modernisation²⁷.

²⁴ http://www.s3vanguardinitiative.eu/sites/default/files/contact/image/vi_workshop_on_clustering_policy_-_discussion_note_final.pdf

²⁵ <http://s3platform.jrc.ec.europa.eu/agri-food>

²⁶ <http://s3platform.jrc.ec.europa.eu/s3p-energy>

²⁷ <http://s3platform.jrc.ec.europa.eu/industrial-modernisation>

Bridges, brokers and boundary spanners

Existing university institutions could be incentivised to relate in a new way to their peripheral environments. In the short time span, there are micro level solutions: *bridges, brokers, and boundary spanners*.

Brokers speak two languages, the language of the science and that of the industrial practitioner, and are expected to industrialise the new scientific discovery. Micro-level connections between science and various economic practitioners are comprised of real or virtual communities of people who are able to communicate, discuss, invent, solve problems and work together as they share two different types of knowledge: scientific knowledge and that of the industry. These communities of *knowledge brokers* may in various ways be supported by institutions. They may facilitate a dialogue and problem-solving outside and across the narrowly-defined boxes of closed innovation systems, across sectors and organisational borders, and across space. It may be important to establish at least several links to help universities to reach out to remote peripheries.

Knowledge brokers need *bridges*, say, in a regional university, or attached to other types of institutions which enable brokers to operate and communicate with other scientists, remote universities, and at the same time with practitioners on a more or less permanent manner. These bridges may be local institutions close to the industries involved, such as industrial parks and other forms of technology transfer infrastructure.

Boundary spanners work together with knowledge brokers. They discover gaps with no bridges, potential networks between science and industrial knowledge, and different knowledge communities, all of which should be opened.

Create new and renew old paths

During the NOKIA breakthrough in 1990, Nordic networks and macro regional institutions provided crucial support to the formation of the GSM standard which was the institutional context enabling the growth of Ericsson and NOKIA mobile telephone production. Following the Finnish experiences, with the collapse of mobile phone production and a new round of transformative change in Nokia²⁸, there is a renewed interest for topics like new path-creation, and the need for diversification within the regional platform of development. Diversification and new path-creation may in several cases rely on the ability of regional innovation eco-systems to absorb and exploit new, emerging opportunities in global communities and industrial networks, through rapid reconfigurations of their own eco-system.

New value chains may exploit cutting-edge technology, but they may also, through processes of innovation driven for the most part by industrial skills and networks of expertise rather than high-tech science, make entrepreneurial discoveries through the recombination of existing resources and technologies²⁹. These strategies of diversification often follow general principles and methods, and are at the same time applicable in a variety of different institutional contexts. They are often diffused through open systems of innovation, involving broad networks of transnational learning, facilitated through instruments such as INTERREG and Horizon 2020.

²⁸ Sabel, C. and Saxenian A., (2008). *A Fugitive Success: Finland's Economic Future*. Sitra, Helsinki. *Also, see: Virkkala, S., Mäenpää, A. and Mariussen, Å., (2014). The Ostrobothnian model of smart specialisation. Proceedings of the University of Vaasa, Reports 196.*

²⁹ Trippl, M., Grillitsh, M. and Isaksen, A., (2015). External energy for regional industrial change – attraction and anchoring of non-local knowledge for new path development. Paper presented at the 10th Regional Innovation Policy Conference, Karlsruhe October 15-16, 2015.

One example is diversification which could be achieved through the *circular economy*. The transition to a more circular economy, where the value of products, materials and resources are maintained for as long as possible, and the generation of waste minimised, is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource-efficient and competitive economy. Such a transition is the opportunity to transform the economy and generate new and sustainable competitive advantages for Europe. The circular economy will boost EU competitiveness by protecting businesses against resource scarcity and volatile prices, helping to create new business opportunities and innovative, more efficient ways of producing and consuming. It will create local jobs at all skill levels and opportunities for social integration and cohesion.

At the same time, it will save energy and help to avoid the irreversible damages caused by using up resources at a rate that exceeds the Earth's renewal capacity in terms of climate and biodiversity, air, soil and water pollution. A recent report also points at the wider benefits of the circular economy³⁰ including the lowering of current carbon dioxide emission levels. Action on the circular economy therefore ties in closely with key EU priorities, including jobs and growth, the investment agenda, climate and energy, the social agenda and industrial innovation, and with global efforts on sustainable development.

5. Conclusions

S3 begins within a region/country by exploiting place-based expertise and industrial skills within the regional innovation eco-system. The paper refers to emerging RIS3 research which indicates that some regions suffer from insufficient innovation eco-system complexity, followed by sub-optimal innovation performances and path lock-in. This indicates that regional innovation eco-systems could be further strengthened through transnational learning and collaboration.

Two major forms of collaboration are identified:

- Transnational learning, directed towards:
 - o analysis and learning through monitoring and good practice translations and transfers; and
 - o improved design and mechanisms of governance.
- Transnational collaboration on new and existing policy tools to:
 - o reinforce the existing knowledge base, leading to more entrepreneurial discoveries and further economic growth;
 - o align smart specialisation strategies in order to be able to move towards the development of joint macro-regional and trans-European innovation strategies.

The paper suggests that such macro-regional and trans-European smart specialisation strategies could be based on multi-level approaches to experimentally extend and strengthen regional innovation eco-systems. In order to achieve robust and long-lasting outcomes, these experiments could apply some existing S3 tools. Here, an important issue is the transition from temporary programmes, projects and networks to new institutional frameworks for co-evolution and collaboration between smart specialised regions. The next important step is to exploit the European diversity identified through regional RIS3 strategies. The long-term challenge is the strengthening of emergent European and macro-regional systems of innovation, and thus supporting the regions.

³⁰ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. (2015). Closing the loop - an EU action plan for the Circular Economy. <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52015DC0614>

Appendix

INTERREG Europe projects (2016) relevant to Smart Specialisation³¹

Project Acronym	Project Title
HIGHER	Better Policy Instruments for High Innovation Projects in the European Regions
Beyond EDP	Improve the RIS3 effectiveness through the management of the entrepreneurial discovery process (EDP)
BRIDGES	Bridging competence infrastructure gaps and speeding up growth and job delivery in the regions
Clust&RIS3	Leveraging Cluster Policies for successful implementation of RIS3
CLUSTERIX 2.0	New Models of Innovation for Strategic Cluster Partnerships
SmartPilots	Improving policies in support of shared pilot facilities to increase their impact on the Key Enabling Technology Industrial Biotech and the European Bio-economy
S3Chem	Smart Chemistry Specialisation Strategy
S34Growth	Enhancing policies through interregional cooperation: New industrial value chains for growth

³¹ <http://www.interregeurope.eu>

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