

SMARTSPEC



**SMART SPECIALISATION FOR
REGIONAL INNOVATION**

**Underpinning Effective Strategy
Design**

Reflection Paper: Work Package 4

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1. Introduction: Investigating policies for smart specialisation

The debate around the smart specialisation concept and its applicability to regional development policy has so far concentrated on the design phase of policies, most notably on the question of definition of specialisation domains through an entrepreneurial discovery process involving a wide range of stakeholders. This question of prioritisation is indeed a central piece of the strategy for regions willing to upgrade their economic transformation potential.

However, the implications of such strategic options on policies and policy instruments have not gained much attention so far. What does the adoption of a Smart Specialisation Strategy in a region imply in terms of policy context and content? What are the role, potential and limits of public policy to attain the goals set in a Smart Specialisation Strategy? How to ensure that policies in place serve the objectives of the Smart Specialisation Strategy? Do Smart Specialisation Strategies require new policies along existing ones? Or do they mainly imply a transformation of existing policies, and in which sense? Those questions remain largely unanswered.

The rapid translation to practice of theoretical ideas that are still in development, as is the case of the smart specialisation concept, has consequences and these will be seen in the implementation phase of policies. The fast application of theoretical concepts to policy-making might create uncertainty situations for both academics and policy-makers, but it also gives an opportunity to develop theory in practice rather than a linear leap from theory to practice without ‘proof of concept’ (Cooke, 2007; Aranguren and Wilson, 2013).

The situation with S3 preparations across Europe at the end of 2013 indicates indeed an almost exclusive focus on strategy design, a weak articulation between priorities and strategy implementation, and the absence of appropriate assessment frameworks. This is in line with results from the recent OECD enquiry on smart specialisation, which concluded that the link between policy instruments and the priority setting is not explicit in the vast majority of regions and countries, and that monitoring and evaluation systems specifically geared to smart specialisation were not available (OECD 2013a).

To fill this gap, this work package 4 (WP4) of the SMARTSPEC project focuses on the policy dimension of Smart Specialisation. In particular we address three objectives, which are each a feature of policy at different levels. These three objectives of WP4 are:

- To strengthen understanding of the features which make for strong design in smart specialisation strategies in different contexts;
- To explore the features which underpin the successful implementation of regional innovation strategies;
- To examine the features which underpin effective assessment approaches to smart specialisation strategies.

WP4 thus aims at enlightening challenges, methods and good practices for designing, implementing and assessing policies for smart specialisation within a full *policy cycle*

approach. It aims at producing a comprehensive, policy-friendly, action-oriented analysis of S3 policy process, which will be of use to policy-makers in charge of formulating policies geared towards smart specialisation. A main concern for this WP is the development and use of a strong *evidence base* to substantiate policies, at all stages: design, piloting, deployment, monitoring, assessment, revision.

WP4 investigates ways and means to *operationalize* the S3 concept into a strategic *policy process*. WP4 makes the link between, on the one hand, research carried out in WP1, 2 and 3, focusing on the key components of the S3 concept, and, on the other hand, the policy dimension of S3. Hence, WP4 aims to investigate policy *means*, in the framework of policy goals derived from the smart specialisation strategy.

In line with the rest of the project, research in WP4 will take into account the *diversity in regional profiles* and elaborate policy recommendations that are tailored to this variety in “potential for S3” displayed by different types of regions (see WP5).

WP4 (together with other WPs) contributes primarily to the following objectives of the SMARTSPEC project:

- Objective 5: supporting the production of better metrics, evaluation and monitoring of smart specialisation strategies and the design of an asset-based multi-sectoral policy mix;
- Objective 6: development of processes of peer review assessment of strategies.

The remainder of this Reflection Paper is divided into two parts:

Section 2 sets out the Research Questions and Hypotheses underpinning the Work Package

Section 3 identifies specific challenges facing policy makers in operationalizing smart specialisation concepts in the design, implementation and assessment of RIS3 policies

2. Research Questions and Hypotheses

2.1 Introduction

The smart specialisation approach raises conceptual as well as practical questions for policy-makers. However the policy process does not take place in a vacuum: most countries and many regions have experience in designing and implementing innovation policies on their territories. This creates a baseline on which the new challenges posed by the smart specialisation approach are turned into concrete choices. The goal for policy-makers is to build on the existing policy framework and implement the changes needed to align policies with the new strategic orientations.

The main preoccupation in implementing policy (changes) is to ensure that the strategies are reaching their intended goal of transforming economies towards more competitive, job-rich and sustainable ones. The policy choices concern primarily:

- i) at *identification* stage, the ways and means to set an entrepreneurial discovery process in motion in order to identify specialisation domains, and the definition of the role for public policy in achieving the intended goals of the strategy;
- ii) at *implementation* stage, the definition of instruments to be used by public authorities and the organization of the policy mix with a view to support the priorities; and
- iii) on a *continuous* mode, the organization of robust and outcome-oriented monitoring and evaluation mechanisms with the goal of raising policy effectiveness.

The following overall research questions at the heart of this WP are discussed briefly in the rest of this section:

- How is smart specialisation related to innovation policy at regional level?
- What is meant by policies for smart specialisation?
- What stage of the policy cycle is concerned?
- What are the key challenges for S3 policies?

The next section (section 3) takes up S3 policy challenges individually and discusses them more in detail.

2.2 How is smart specialisation related to innovation policy at regional level?

The concept of smart specialisation, originating in academia (Foray et al. 2006), has been quickly adopted in policy circles: it is seen as powerful mean to *respond to several shortcomings of regional innovation policies*, as they are designed and implemented to date in Europe. The shortcomings can be summarized as follows:

- *Fragmentation and duplication* of public investments for R&D and innovation within and across regions, resulting in lack of critical masses for innovation activities in regions;
- *Lack of synergies*, within regions, between knowledge economy actors: science, business, administration, social partners (Cooke and Morgan 2008);
- Deficiencies by regional innovation actors in building and *hooking to external knowledge networks*, inward-orientation of regional innovation systems and policies, leading to missed opportunities in cross-border and international innovation (policies) (Benneworth et al. 2011, OECD 2013a);
- *Weak strategic approaches* in designing innovation policies for the regions: priority choices driven by pressure from lobbies; short term views associated with short political cycles; insufficient drive towards, and immature tools for designing and implementing outcome-driven policies (Barca and McCann 2011); lack of knowledge on policy effectiveness, for individual policy instruments as well as for policy systems; gap between policy documents and policy mixes, policy implementation characterised by inertia and stickiness – or by naïve adhesion to changing fads (Kuhlmann 2001; Nauwelaers and Wintjes 2008; OECD 2011).

As a result, there is dissatisfaction with these policies and a growing need to demonstrate their effectiveness. The core components of the S3 concept - and more particularly the entrepreneurial discovery process - if they are supported by strong policy intelligence, provide possible responses to these shortcomings. Engaging in smart specialisation strategies brings the possibility to respond to the question of how and where to focus public investment in innovation, in view of reducing fragmentation and enhancing internal and external synergies, and ensuring maximum impact of public intervention. By breaking path dependence and entering into new path creation, S3 can provide a response to the ineffectiveness of regional innovation policies.

The hypothesis for the work in WP4 is that the S3 concept underpins *a new generation of regional innovation policy*: this WP investigates how these policies can be transformed to leverage the potential brought by this concept.

2.2 What is meant by policies for smart specialisation?

The smart specialisation approach, when adopted in a region, both influences and is influenced by a range of policies that go much beyond the programmes prepared for the European Commission in the framework of Cohesion Policy (under which the production of a smart specialisation strategy has been made compulsory). This covers:

- Policies from various *levels* of authorities: local, regional, national, EU. The balance and type of articulation between these policy levels depend on the institutional situation of the regions in their national environment and on the importance of EU support under cohesion policy (higher in less developed regions). All the policies that are active on a territory influence the conditions for innovation in the region, regardless of their origin;
- Policies from various *domains*: economy, science and technology obviously but also other policies will need to be tailored to the smart specialisation choices (infrastructure, environment...). Thus a broad scope is considered for defining the boundaries of innovation policy under investigation here.

Taking a user-driven approach and looking at policy impacts, create the need to take a broad approach towards the range of policies that are relevant for translating the S3 concept into policy-making practice. Impacts on policy targets and beneficiaries will depend on the combination of policies that are at play on a given territory, notwithstanding their origin (regional, national, supra-national) and their domain.

The hypothesis for the work in WP4 is that policies for smart specialisation refer to the *broad combination* of policies from various levels and various domains, which are forming a policy system acting on the different components of a smart specialisation strategy.

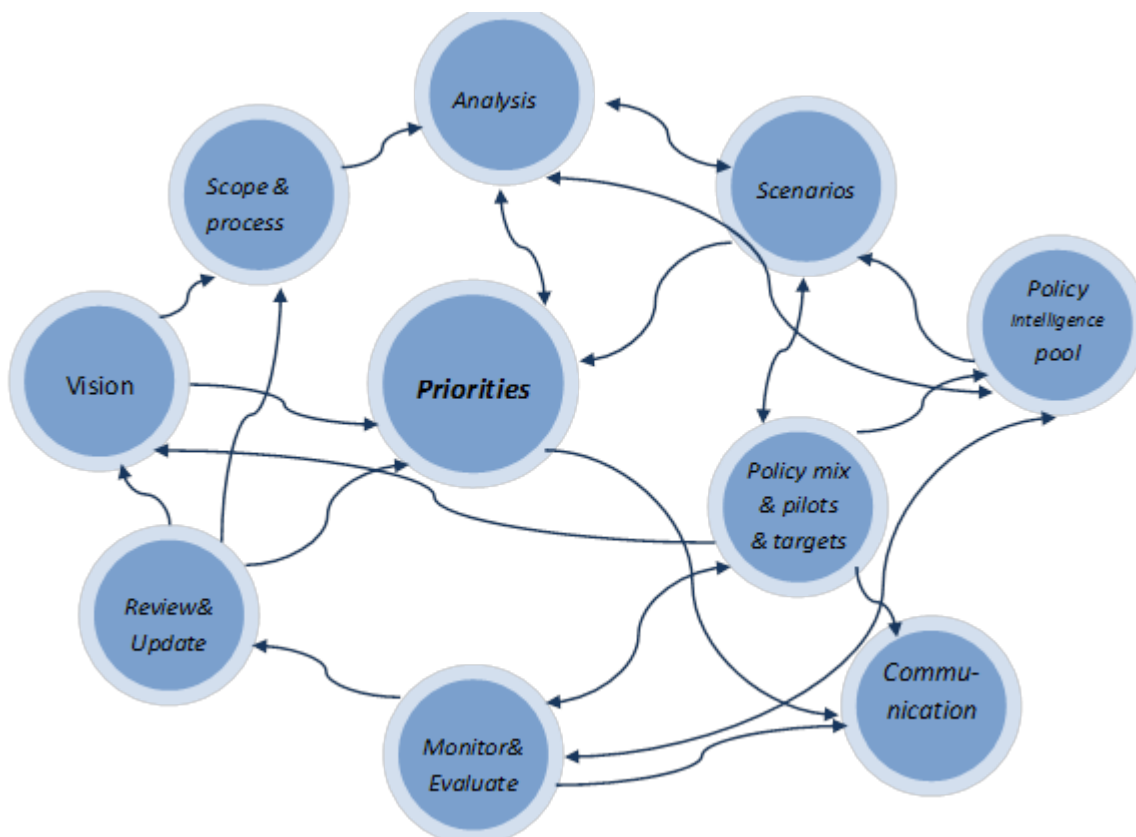
2.3 What stage of the policy cycle is concerned?

The notion of *policy cycle* is important in WP4 analysis. This refers to the various steps concerned when deciding on, and implementing policies, and to the interaction between them. A simplification of the analysis of a policy cycle defines it along *three major components*, which tend to be viewed as sequential and hence often referred to as “steps” in the policy process:

1. RIS3 Design;
2. RIS3 Implementation;
3. RIS3 Assessment.

The reality is much more complex, as depicted in Figure 1 below. Even if there is some sequencing over time between the deployment of the above three components of S3, these need to be closely intertwined. In particular, the consequences on policies of the new orientations decided under S3, and the identification of their expected outcomes against which their effectiveness can be evaluated, need to be part of the policy process right from the beginning.

Figure 1. Components of a S3 policy process



Design includes the definition of scope and the identification of key actors; the adoption of a joint vision, conducting studies, consultations, debates, creating scenarios, which result in the identification of priorities and role of public action. *Implementation* involves the translation of broad objectives into more detailed goals, the setting up of pilot projects, the mainstreaming of some of them in existing or new policy lines, the fine-tuning of a policy mix responding to the priorities, the identification of stakeholders in charge of the implementation, the decision about budgetary sources and the modes of delivery of public funding, etc. Communication on policy is another important element, part both of the design and the implementation steps. The *assessment* stage incorporates the production and use of monitoring and evaluation data and the feedback of this into the policy cycle, assessing both the relevance of goals and of actions deployed to reach the goals, thus reverting both to the design and implementation stages. Policy intelligence tools, methods and capacities are vital elements at assessment stage, but they are also crucial for the design and implementation steps.

As argued in introduction, observation of current practice in S3 development in European regions points towards an almost exclusive attention paid towards the design step, and most particularly, the prioritisation issue. The risk is that many regions devote efforts to consultations and analyses in view of determining smart specialisation domains, and that their S3 is limited to: 1) an argumentation for and definition of these domains, 2) and the funding of a number of ad hoc “S3 projects” under the Structural Funds, leaving the rest of policies (relevant for regional innovation) unaffected. If this risk is confirmed, S3 will result in

interesting exploratory approaches, but not in the *major overhaul that is needed to address the major shortcoming in regional innovation policies*, as referred to above (see 2.2).

Given that the timing for the launch of SMARTSPEC corresponds to a period where most regions will have written at least a draft of their S3, it seems appropriate to put a major focus in WP 4 on: how strategies have been designed and how the prioritization has been arrived at; how to move from prioritization to the definition of an adequate policy mix (including all relevant policies whatever their origin, see 2.3); and how relevant monitoring & assessment frameworks, which are well integrated into the policy cycle (i.e. meant to inform both design and assessment of S3 policies) are being discussed or designed. This means that the focus can be equally spread between the three objectives of WP4 (strategy design, implementation (i.e. appropriate policy mix plus governance arrangements) and assessment).

The unit of analysis for the work in WP4 is the *full policy cycle* for S3 policies, incorporating design, implementation and assessment in an interactive and recursive mode. Work in WP4 aims at understanding features which underpin effectiveness in all those components of the policy process.

2.4 What are the key challenges for S3 policies?

Observing current practice in developing S3 and taking on board broader knowledge around regional innovation policy dynamics, we can already identify (and in this sense preempt) seven main policy challenges (Box 1) (Ketels et al. 2013). They span the whole S3 policy cycle and are present with a different level of intensity in all three components of this cycle (design, implementation, evaluation) (Table 1).

These challenges arise from two primary sources. Firstly from the well-acknowledged dimensions which give complexity to regional innovation policy: multi-level governance, policy path dependence, policy-mixes, etc... Secondly from the heterogeneity in regional government competences and capabilities, including the notion of whether administrative boundaries fit the functional region (and therefore taking on cross-border issues) (Magro and Wilson 2013).

Those challenges have always been present to a certain extent in efforts to develop regional innovation strategies in the EU since the nineties, but they take a particular importance in the context of S3. Each of them represents a possible bottleneck for turning the S3 concept into a new generation of more effective regional innovation policies.

Box 1. Challenges in S3 policy process

CHALLENGE 1: The “prioritization” challenge: how to select (and justify) priority intervention domains for S3? How to put an entrepreneurial discovery process in motion?

CHALLENGE 2: The “stakeholders engagement” challenge: how to promote participation, engagement and commitment of the variety of stakeholders? Who are the most relevant stakeholders to engage in a S3 process? What are the respective roles of government, private agents, universities and how should these roles be balanced? How to avoid a rent-seeking behaviour when involving stakeholders?

CHALLENGE 3: The “policy mix” challenge: what are the adequate policies for S3? Which policy domains are concerned? How to ensure a synergetic and effective policy mix? Which are the main instruments that can be implemented to address vertical priorities and horizontal priorities, taking into account entrepreneurial discovery processes? What is the relationship between the implementation of these instruments in a S3 framework and their existing implementation?

CHALLENGE 4: The “multi-level governance” challenge: What is the role of multi-level governance in the S3 policy process? How to align policies from national, regional, EU levels within a S3 perspective? What coordination mechanism are needed?

CHALLENGE 5: The “cross-border collaboration” challenge: what is the appropriate territory to conduct a S3 and how to tailor polices that conform to it? What are the implications for S3 policy when administrative and functional regions differ? How can S3 be designed and implemented in regions with strong cross-border dynamics to ensure the benefits from synergies between strategies and policies?

CHALLENGE 6: The “smart policy-making” challenge: what tools for evidence-based policy (measuring, assessing and learning for the purpose of more effective S3 policies)?

CHALLENGE 7: The “policy capacity” challenge: what are the necessary resources and skills that need to be made available to S3 key actors? What balance between internal and external resources? What differences are likely to be encountered for S3 in regions with high / limited policy capacity? And high / limited institutional competences?

Table 1. Challenges in S3 policy process and 3 policy phases

	DESIGN	IMPLEMENTATION	ASSESSMENT
Prioritization	■	■	■
Stakeholders engagement	■	■	■
Multi-level governance	■	■	■
Policy mix	■	■	■
Smart policy-making	■	■	■
Cross-border cooperation	■	■	■
Policy capacity	■	■	■

■: challenge present to a large extent

■: challenge present to a less prominent extent

The hypothesis for the work in WP4 is that effectiveness of S3 policies will depend on successfully addressing *seven key challenges*. Work under WP4 will investigate, based on field analysis and conceptual developments, what forms these challenges take and what options are available to policy-makers to address them.

3. RIS3 Policy Challenges

3.1. Challenge 1: The “prioritization” challenge

Identifying the priorities of a Smart Specialisation Strategy (S3) is highlighted as one of the key steps in formulating a S3 (European Commission 2012a). Strategies, it is argued should focus on a “limited number of innovation and research priorities... (in)... areas where a region can realistically hope to excel”(p.22 European Commission 2012a). As an example of prioritisation the Commission showcases Berlin-Brandenburg, which prioritises five “Fields of Excellence” including: Biotechnologies and Medical technologies and pharmacy, Energy technologies, ICT and new Media, Optical technologies, and Transport system technologies. These are, themselves, underpinned by 4 cross-sectoral priorities: New materials, Production and automation technology, Cleantech, and Security (op cit, p.23).

The rationale for selecting a limited number of priority fields is partly one of effectiveness and partly one of efficiency. It is well-recognised that there are limited public funds available for investment in research and innovation. Investing these in a small number of priority fields will, it is argued, be a more efficient use of public funds. Equally, this will also prove more effective as it enables the establishment of critical mass, a more coherent framework for related investments and – by focusing on regional strengths – avoids the duplication of imitative policies across the European territory.

Whilst identifying priorities is just one of six steps in the S3 process, it is, arguably, the one that is subject to most debate. In part this is because it involves choosing between potential priorities, a process that is undeniably political. However, it is also due to the uncertainty as to how a priority should be defined (such as the Fields of Excellence approach in the example above) and the number of priority fields that might be selected.

Whilst the language of S3 speaks of priority fields and domains (Foray 2007), the policy actor is often faced with choices based around traditional industrial sectors or science-technology disciplines. This is partly due to the inherited understanding of the main actors, but also to the manner in which statistics are collected narrowing the options to those that can be measured and conveniently codified.

In selecting priorities, actors are then faced with uncertain choices. Should they support the existing industrial strengths of their regions or promote areas of emerging potential, which may have less immediate impact on levels of employment and economic output? In doing so, how selective should they be? Is it sufficient to select a broad priority field or should they drill down to greater degrees of specialisation? There are strengths and weaknesses to both approaches, which are, as yet, only weakly specified in practical settings.

The RIS3 Guide (European Commission 2012a) argues that the definition of areas of strength will emerge from an entrepreneurial discovery process, combining bottom-up search from innovation actors and top-down orchestration by regional leadership (a perspective that we examine further in the following challenge). However, it is apposite to query how this process is enabled, through the analysis of quantitative data, which may be subject to lags in Smart Specialisation for Regional Innovation: WP4

availability, or through the use of more qualitative datasets, that might be subject to bias. Another part of the SmartSpec project (WP1) will dig into the analytical and empirical bases, as well as the implementation issues of the entrepreneurial discovery process, exploring notably the question of assessing the degree of related variety between industries, as a rationale for defining specialisation domains. WP1 will also clarify the respective roles of internal and external connectivity in driving regional development: this is an important issue to avoid an autarchic approach in the design of S3 policies. The main question in WP4 is the translation of these results in the design of regional innovation policies with a transformative goal. Hence this question will be treated with a main (but not exclusive) focus on the design stage of S3 policies.

A further consideration for policy-actors is the weight to attach to the priority fields identified. Should all available resources be focused on these, or should there be a proportion reserved for horizontal actions targeted on supporting the development of innovation wherever it may be found? This is a particular concern in regions with less-developed research and innovation systems, where the issues are systemic and there is concern that overly-focused priorities will fail to deliver on the real challenges facing much of the economy concerned. Similarly, in countries with more advanced regions, how might a tightly focused strategy respond to the need to support novelty and the emergence of new fields of activity? Is there a risk that too strong a focus on priority fields will lead to longer term sclerosis and the embedding of path-dependency?

A final consideration for the prioritisation challenge is how the selection of priority fields responds to similar priority setting at alternative scales. How regional RIS3 (for example) deal with priorities identified at the national and European scale (and vice versa) is a question that will be partly considered under the theme of multi-level governance but also has implications for priority setting. As one of the rationales for RIS3 has been to overcome fragmentation and duplication of research efforts, whilst maximising the efficiency and effectiveness of investments, this coordination challenge is being faced on an ongoing basis across a number of Member States.

How these choices are made lies at the heart of the ‘prioritisation challenge’. Two main questions will be addressed under this challenge:

1. How does policy history influence, constrain or open opportunities for policy choices in line with S3? Regions with rich history in developing innovation policies might benefit from more experience and a better knowledge of innovation potential, but they might also suffer from policy stickiness and inertia in organisations and institutions preventing them to implement such choices. Here a longitudinal approach will need to be taken to explore the issue of the *influence of path dependency in S3 policy design*;
2. What are the criteria to be taken into account for the definition of priority domains for S3, and how to operationalize them in practice? Here, it is suggested, as a starting point, that five criteria need to be met by any activity domain standing as a candidate for a S3 priority domain:

- Potential for new, future markets creation (across-sectors);
- Existence of a distinctive economic potential in the region;
- Existence of a distinctive education and research potential in the region and/or presence of strong linkages to external knowledge sources;
- Quality and thickness of the innovation ecosystem, types of structural linkages and synergies;
- Contribution to the solution of specific regional challenges.

3.2. Challenge 2: The “stakeholders engagement” challenge

The principle of stakeholder involvement is embedded in the smart specialisation approach, both through the notion of a ‘bottom-up’ process of entrepreneurial discovery (European Commission 2012a, Hausmann and Rodrick 2003) and the development of Smart Specialisation Strategies. Most attention to date, particularly in the burgeoning application of the Smart Specialisation principle has focused on the latter.

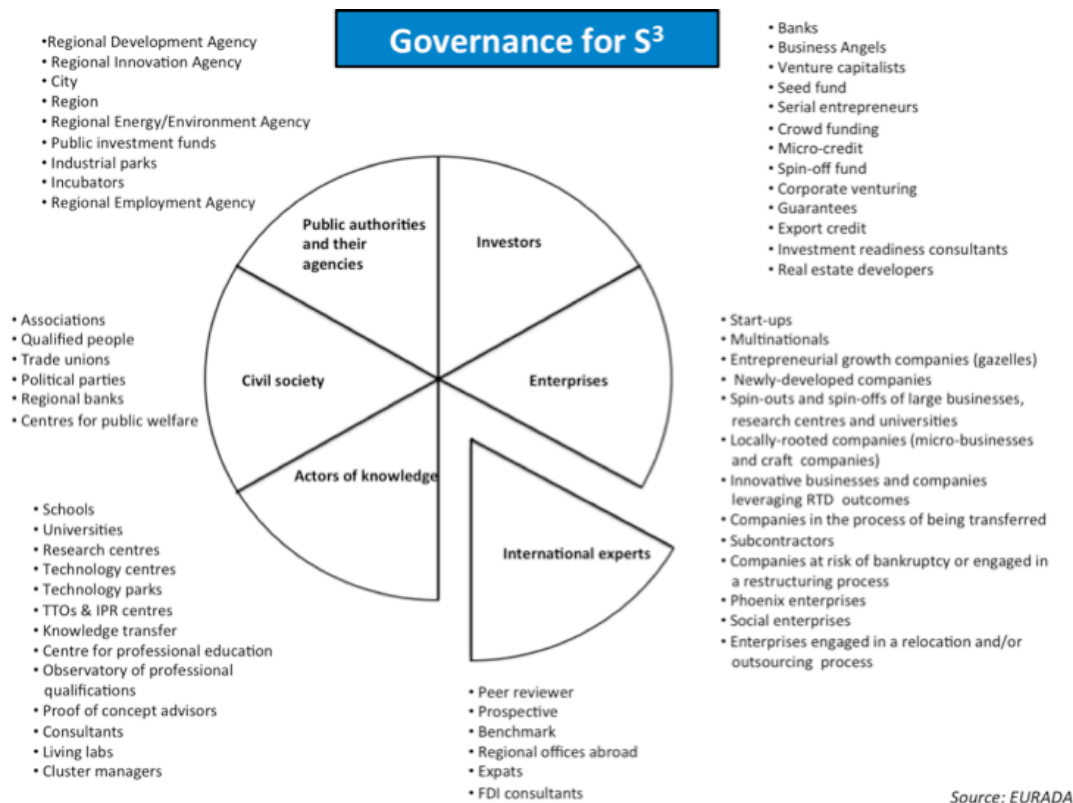
One of the first challenges here is the question of who to involve. There is now a fairly common acceptance of the Triple Helix (Etzkowitz and Leydesdorf 2000), leading to the broadly standard inclusion of representatives of the business, university/Higher Education and public sectors as representatives of relevant stakeholder interests. In some cases this is extended to include representatives of civil society and other societal actors in what is now termed the Quadruple Helix. However, within these groupings there is much variability. Businesses can prove difficult to engage in a practical manner, particularly crucial SMEs. Business representative groups often act on behalf of individual businesses, but these may be skewed to longer established, more traditional sectors or toward highly innovative, high profile sectors. Similarly, there is variation as to which parts of the public sector are involved in the development of Smart Specialisation Strategies, risking that some policy fields are under-represented in the final S3. Even at a low level of granularity the range of potential stakeholders is clearly illustrated below (Figure 2).

Engaging stakeholders also provides a strong logistical challenge. How can their knowledge best be assimilated in ways that promote the development of a Smart Specialisation Strategy? Will traditional engagement methods suffice, or will these simply replicate traditional approaches to research and innovation, rather than the novel modalities suggested by S3? In many cases, regions and Member States have demonstrated prodigious engagement practices, which then lead to the challenge of analysing, sifting, weighting and prioritising the myriad views presented. What happens where there is a lack of consensus, or where the majority consensus reflects entrenched traditional perspectives, favouring standard sectoral approaches or negating informed but minority opinions?

Those developing S3 also need to consider the rationale for engaging with stakeholders. At one level this might be for purposes of consultation, validation or credibility-building. Often it is a key part in the development of ownership of a strategy, in order to better secure its future successful implementation. Linked to this, it may also be to secure investment commitments from the stakeholders themselves, to encourage the development of a shared strategy. However, at its simplest level, and certainly in the initial phases, a key reason may

simply to raise awareness and understanding of what smart specialisation involves and the potential implications of this. One of the key questions to also be considered is the motivation for stakeholders to engage in the S3 process. Is it through some statutory responsibility or sense of civic duty, is it due to a wish to develop a common agenda for action, or might some reasons relate to rent-seeking behaviours or the maintenance of a particular status quo?

Figure 2. Stakeholders engagement in S3



As with the prioritisation challenge, taking into account the time dimension and an evolutionary perspective on policy are also necessary here: over time, regional governance is often captured by a “clique” which in practice prevents the participation of new actors in promoting new orientations for the regional economy. This kind of stickiness is particularly harmful for the setting up of a S3 policy process, which precisely demands to be open to new ideas and new combinations of assets (skills, traditions, expertise, access to networks and markets...). Whilst S3 may be about bringing new approaches, stakeholders often bring with them old ideas.

One of the under-considered aspects of stakeholder engagement is how this is continued over time. Is it a one-off process, which ends once the strategy is designed, finalised and accepted, or is it part of an ongoing process, closely associated with both the implementation of strategy and policy and the monitoring of progress? Arguably, stakeholder engagement cannot be a one-off activity, it should be continued as part of a process of implementation and monitoring, but how might this be formulated and how does it relate to the governance of research and innovation systems. These are key questions to be considered both here and elsewhere in the study.

The problem of stakeholders engagement (who, how, when, for what purpose?) is intimately linked to S3 as a new approach for regional innovation strategies. Policies with a transformative goal will arise when two conditions are met:

- *Pressure for transformation*, recognition of need for change, will need to be present on a relatively broad and high level in the region;
- *Change agents* need to be present, mobilised around the need for change and the creation of a future-oriented vision for the territory, and develop the capacity to challenge the status quo and induce changes in the regional trajectory.

Having qualified and well-informed actors present in a region is not sufficient to ensure that they act as change agents. Typically, in less developed regions, many actors (firms, universities, cities, new entrepreneurs, etc.) possess relevant information on current and prospective development potential in the domains they are involved in, but fail to join forces to identify possible synergies and future transformative avenues for the territory they are located on. The footloose character of multinational corporations establishing branch plants in such regions is notably a hurdle in this respect. The parallel worlds separating academia and companies are another typical hurdle. A lack of platforms where actors from different arenas can meet, share disparate agendas and build joint visions is another frequent hurdle.

The challenge thus consists in *identifying* and *mobilising* those agents that can feed the entrepreneurial search process (see WP1 on that issue) by bringing in their knowledge and assets for regional development at the forefront, creating synergies in a situation of distributed capacities, and building on them to create the regional partnership that stands behind a S3.

The need to take into account stakeholders' involvement holds for the whole S3 policy cycle: while it has become relatively common (notably in the wave of RIS and RITTS processes) to involve different regional actors at some point in the design phase (through consultations, working groups, etc.), they are more seldom engaged in the implementation and evaluation phases. Going beyond a planning approach and if we consider S3 as a "living" process (Aranguren et al., 2013), actors' involvement should be a continuous element throughout the process.

The role of policy-makers in facilitating stakeholders engagement into S3, at various points in the policy cycle, and setting in motion a process where stakeholders and regional development learn together, will be the main focus of research under WP4.

3.3. Challenge 3: The "policy mix" challenge

Establishing an efficient "policy mix" for S3 is core issue at the heart of the S3 policy cycle. While the orientation and broad equilibria for a policy mix should already have been thought over at the S3 design phase, a concrete definition of its composition and mode of delivery is the heart of the S3 implementation phase. And a clear definition of goals assigned to the policy mix (and its individual components), along with the setting up of effective monitoring mechanisms of its implementation, are necessary pre-conditions for moving further, into the S3 assessment phase.

The policy mix concept has been applied to innovation policy studies following its earlier application to other types of policies, such as environmental policies, without reflecting very much on the specific implications for innovation policy practice (Flanagan et al. 2011). Although the literature includes several studies that try to shed light on innovation policy mixes (Nauwelaers et al. 2008; OECD 2010; Flanagan et al. 2011; Magro and Wilson 2013; Borrás and Edquist 2013) the term remains under-conceptualised in innovation policy studies. We define it as the *combination of policy instruments that interact in given policy system*. These instruments could be responding to different rationales (neoclassical or systemic ones) and corresponding to different policy domains. In addition, and taking into consideration that regions could be considered as policy spaces in which policies from different levels are being felt (Uyarra and Flanagan 2010), instruments from different levels are also part of what is effectively called policy mix (Flanagan et al. 2011). Nevertheless, and for the sake of simplicity, the interrelationship among instruments from different government levels are discussed under the multi-level governance challenge below.

When moving from S3 design to S3 implementation, a double question arises with respect to the policy mix issue:

1. What are the boundaries of S3 policies (which policy domains are affected?)
2. How can S3 policies be translated in specific instruments and tools, and how do these instruments relate to, or differ from existing ones?

S3 policy mixes: multi-domains policies in need of horizontal policy coordination

Although S3 policies will be put in place in many regions as a *regional strategy covering several policy domains*, problems are likely to arise in the implementation phase due to innovation policy complexity in regions and to the systemic nature of these policies (Magro and Wilson 2013).

There has been a broadening and deepening of science, technology and innovation policies (Borrás 2009) that has added complexity to innovation policies and that clearly has implications for the smart specialisation concept and its translation into policies. This phenomenon is also a response to the move towards evolutionary and systemic approaches and it implies that innovation policies cannot anymore be assigned to a specific policy domain. Rather, they are spread through different domains.

Innovation policy theory and practice have co-evolved (Mytelka and Smith 2002; Braun 2008), but these evolutions have not always followed the same speed. Therefore new policies often co-exist with previous ones, without taking into account the interactions between them (Flanagan et al. 2011; Magro and Wilson 2013). This results in policy mixes that are present as “ex post” accumulation of policy instruments, rather than being the result of a design process, taking into account the overall shape and balance between its various components (Nauwelaers et al. 2008). In particular, policy frameworks, including the framework behind S3, have evolved towards *systemic approaches* but policy-making has not evolved following the same path (Braun 2008). This leads to challenges and conflicts that go beyond policy theory and that have several implications for smart specialisation strategies in practice. In

particular, governments have not evolved towards holistic and multi-domain policy-making and they still have divisions in ministries and departments that might affect the implementation of S3.

S3 are based on prioritisation processes that are not new in the STI policy literature: *two types of policies* can be distinguished: the ones that take into account thematic priorities and the ones that focus on functional priorities (Gassler et al., 2004; Navarro et al., 2013). The former refers to S&T areas or industries that are crucial for regional development and the latter is related to the systemic failures or problems that the policy wants to overcome. The latter are closer to regional innovation system approaches and innovation policies based on those approaches. Actually, S3 aims at *combining both types of priorities, thematic and functional*, in an integrated way and adopting a new approach for the definition of “themes”.

Looking further into the policy domains that might be affected by S3, we can distinguish between policy domains related to thematic priorities and policy domains related to functional ones. The first ones could be easily linked with policies that are sector-based or S&T policies that focus on specific technologies, but also with industrial and cluster policies. In addition, all the policy domains that are activity based and include innovation objectives (such as energy, health, ICT domains) are affected by S3 policies, especially by thematic priorities. The second ones are broader and can be included in all the domains that are affecting the regional innovation system (from general science and education policies to financial policies). An attempt to categorise the possible policy domains that delimit the scope of S3 policies is reflected in Table 2.

Therefore, two main views on S3 policy can be distinguished: the narrow and the broad view. The narrow view of S3 policy would affect only the policies that belong to the Science, Technology and Innovation domains without taking into account the other domains. The broad view of S3 policy would consider *S3 as a systemic and holistic policy framework* which impacts on a whole range of policy domains and in that sense is truly a regional development strategy. It is this second approach that will really affect the direction of innovation in a region, and therefore the approach that regional policy makers should address in practice. The main potential risk here is that a holistic view is taken in the design phase, but then the implementation of the S3 is undertaken by one department or ministry with competences in a unique domain without any coordination with the rest of ministries and domains. Another potential risk is that the design (and later implementation) is geared specifically towards European funding requirements and in particular to the attraction of ERDF funds. This focus would be unlikely to result in an integral and truly regional strategy (see multi-level governance challenge below).

Table 2: Policy domains for S3

Policy domains	Thematic priorities	Functional priorities
Innovation Domain	Sectoral innovation policies	General innovation policies
Science and Technology domain	Sectoral and GPT based policies	Human resources policies related to science
Industrial domain	Cluster policies	Human resources policies related to industry Internationalisation policies
Financial domain	Sector-specific fiscal policies	Macroeconomic policies Fiscal policies
Other domains	Energy policy, environmental policy, health policy, transport policy, etc...	Social, employment and welfare policies

Source: Own elaboration based on Nauwelaers et al. (2008)

Adopting a broad view on S3 policy has strong implications in terms of *coordination mechanisms* for the policy: coordinating goals and means across a large range of policy domains, ministries and agencies, and between a wide diversity of policy instruments is a necessary requirement for the design and implementation of an effective S3 policy mix. Establishing effective horizontal coordination mechanisms within regions is therefore the pending task. That would mean considering S3 not only a duty of innovation related departments or departments that deal with ESIF Funds but also planning, implementing and evaluating this strategy following a systemic perspective. In terms of implementation this would mean a reflection about the coordination mechanisms needed for an effective S3 implementation within the region (i.e., creation of agencies, committees, networks ...). It will also be necessary to assess the costs-benefits of establishing such coordination mechanisms and not coordinating for the sake of coordination (Magro et al. 2013).

S3 policy mixes: interactions between policy instruments in line with S3 priorities

There are a wide range of studies that try to categorise innovation policy instruments at regional level; both academic publications (Nauwelaers and Wintjes 2003; Georghiou et al. 2003), Edler and Georghiou 2007) and policy documents (OECD 2010; OECD 2011; Guide for S3 2013). They all provide useful classifications and examples of policy instruments that regions could implement. However, none of them can provide unique recipes for effective policy mixes, as policy instruments will depend on the regional context and profile, including institutional power (one size does not fit all) (Tödling and Trippel 2005), the strategy the region wants to implement, and the existing instruments already implemented in the region (due to path-dependency processes). Therefore it is necessary to improve our understanding and learning around what works and how in a region, around specific regional contexts, and around the possibilities that different instruments and their mixes can offer as contribution to the goals established in S3.

The broad portfolio of instruments found in the literature can be classified into thematic and functional priorities, on the one hand, and supply-side and demand-side instruments, on the other hand (Table 3). The policy mix approach indicates that *interactions* between policy

instruments need to be understood when designing and assessing portfolios of policy instruments. In particular interactions between existing and new instruments need to be studied, before implementing new ones. Also, it is important to understand the advantages of combining supply- and demand-side measures, in an integrated approach for implementing S3 strategies (Edler 2007).

Table 3: Examples of regional policy instruments for S3 according to priorities

Policy instruments	Thematic priorities	Functional priorities
Supply-side instruments	R&D grants in specific sectors Technology funds Investment in sectoral-based knowledge infrastructures and research centres	Investment and support of universities Science parks Human capital for R&D Incubators
Demand-side instruments	Public procurement for innovation focused on specific sectors Cluster policies Network policies	Innovation Vouchers Training and mobility programmes Innovation awareness raising programmes

Source: Magro and Wilson 2013

Demand side instruments and S3

The main purpose of demand side interventions is to increase the demand of innovations, to improve the articulation of the demand in a system or to improve the conditions to carry out innovations (Edler 2007). Typical demand-side instruments are: the use of regulation and standards, systemic policies such as cluster policies and public procurement (Edler and Georghiou 2007).

Although demand-side instruments can contribute to both thematic and functional priorities, they are particularly relevant for the thematic priorities that regions identify as part of their S3. Demand-side instruments have been implemented in most regions during recent years, following the recognition that supply side instruments are not always the most adequate in a system of innovation approach (Edler 2007): this type of instruments responds to systemic and evolutionary failures or problems instead of neoclassical ones (Chaminade and Edquist 2006). These problems relate not only to network problems that could be addressed with demand side measures oriented towards thematic priorities, such as cluster policies; but also to learning failures addressed by measures geared towards increasing innovation awareness within the system and upgrading innovation-related organizational skills. As an example of these, innovation vouchers have been spread throughout European regions, due to both the increasing awareness among policy-makers of the usefulness of these measures and the relatively low costs of implementation compared to many supply side measures.

Amongst demand-side policy instruments addressing thematic priorities, two types of instruments stand out as particularly relevant for S3 implementation: cluster policies and public procurement for innovation. They are discussed below.

Cluster policy and S3

The question of what clusters and cluster policies can potentially contribute to the construction and implementation of S3 is essential for at least two reasons:

- *Cluster policies as widespread phenomena in the policy landscape and policy path dependencies:* many regions in Europe have adopted cluster policies in the past. Using insights into the role of policy inertia, it has been argued that the introduction of new policy approaches does not occur in a vacuum but in the context of well-established policies. The successful implementation of S3 will thus depend significantly on the extent to which it will engage with the existing policy landscape dominated by cluster policies (see, for instance, Aranguren and Wilson 2013);
- *Similarities between S3 and cluster policies:* Several attempts have been made to compare the two approaches, disentangling similarities and “dividing lines” among them. Aranguren and Wilson (2013), for instance, pointed to key differences between S3 and cluster policies in terms of scale, focus and tools. However, they also found that S3 and cluster policy appear to share several commonalities (such as the place-based nature of policies and the promotion of linkages between actors with complementary competencies), suggesting that various lessons can be learnt from cluster policies for the design and particularly the implementation of S3.

In line with the above arguments, a recent report produced by an expert group for the European Commission comes to the conclusion that clusters and cluster policies are likely to constitute one central element, amongst others, in the construction of S3 (Ketels et al. 2013). As noted above, this holds in particular true for those regions that have adopted a cluster policy approach in the past. The report argues that cluster policies can offer valuable lessons for S3, in particular regarding 1) the selection of priority intervention domains, and 2) the promotion of participation, engagement and commitment of stakeholders (cfr. Challenges 1 and 2 in WP4). However, it was also argued that several limitations exist for the use of clusters and cluster policies in S3. The most important points discussed in the report are: insufficient tools to identify newly emerging clusters, neglect of potential inter-cluster linkages that could form the basis for new knowledge domains, and inward-looking policies that neglect interregional and cross-border dimension of clusters. A key conclusion of the report is that clusters can play an important role as one element in S3 but in order to harness this potential, *a new generation of cluster policy is needed*. In this context and in addition to the issues raised above, there seems to be a need to integrate clusters into the broader regional transformation strategy that forms the core of S3. Such an endeavour, however, requires a *more dynamic view on clusters*. The latter is a key issue for research: S3 aims at regional renewal (McCann and Ortega-Argiles 2013) and it is intriguing to explore the role of clusters in this regard.

Clusters come in various forms and shapes and follow a variety of possible development paths. Cluster research and policy have, however, been criticized for being relatively static. As response *cluster lifecycle approaches* have developed according to which clusters follow a trajectory of four stylized phases: emergence, growth, maturity and decline. Recently, the predetermined logic of lifecycles has been debated and alternative concepts proposed building on evolutionary theory and allowing for a variety of potential development paths.

The burgeoning literature on modern approaches to cluster life cycles (Menzel and Fornahl 2009; Ter Wal and Boschma 2011) and cluster evolution (Martin and Sunley 2011) has strong policy implications. Various authors (see, for instance, Brenner and Schlump 2011, Ingstrup and Damgaard 2013) have argued that *different types of cluster policy measures should be applied in different phases of cluster evolution*. The policy implications following from a dynamic perspective on clusters are, however, still under-researched in some critical aspects (see also Fornahl and Boschma 2011). It is intuitively clear that an emerging cluster needs other policy measures than a mature one or an old one that undergoes decline. Several studies have looked at policies that support the rise of new clusters, whilst others have examined how policy can facilitate the rejuvenation of traditional ones. However, there is a lack of more systematic research on this issue. Research should shed more light on the question of how policies (have to) change in the course of cluster evolution and what sound policy measures and adequate policy mixes are to promote the transformation of different types of clusters (Box 2). This would provide the foundation of a more well-grounded discussion of the role of clusters in S3 and their implementation.

The debate on this issue would also benefit from incorporating insights from the literature (Lester 2005, Martin and Sunley 2006) on various forms of regional path development and regional (industrial) renewal (such as upgrading of mature paths, diversification into related paths and the creation of new ones) and from work on RIS changes that are required to support such transformation processes (Tödtling and Trippl 2013). More recently, a distinction between path extension, path renewal and new path creation has been drawn (see, for instance, Asheim et al. 2013). This strand of literature is highly relevant as there are strong reasons to assume (and claims by scholars working in this field) that adequate policy instruments and policy mixes to promote regional renewal and transformation (should) vary considerably, depending on the type of regional path development. However, thorough theoretical and empirical analyses of such policies are still missing. Finally, it will also be intriguing to explore how the literature mentioned above relates to the typology suggested by Foray et al. (2012) that includes 1) transition, 2) modernisation, 3) diversification, and 4) radical foundation of a new domain.

Box 2. Cluster lifecycle and policy implications

Most cluster lifecycle concepts distinguish between four phases: **emergence, growth, maturity and decline**.

1. Cluster emergence

The emergence of a cluster may relate to the development of a new industry. In such cases, there is a “window of locational opportunity” where the new industry will locate (Storper and Walker 1989). In Smart Specialisation for Regional Innovation: WP4

the phase of emergence there is still a high degree of uncertainty as regards the dominant design and who the dominant agents will be. Basic conditions as regards institutions, infrastructure and resources will be fulfilled in many regions. Therefore, it has been argued that the location of new industry will to a large extent be a chance event. However, the development of a new industry or specialisation in a certain region does not necessarily relate to a new-to-the world technological breakthrough that kick-starts a completely new industry. It can also relate to branching processes where firms search new market niches in fields related to their existing competencies (Frenken and Boschma 2007). Furthermore, the emergence of a new industry can result from the combination of different types of knowledge, i.e. when two different industrial sectors meet. In particular, there is evidence that regions characterised by different but related industrial sectors grow faster (Boschma and Iammarino 2009; Frenken et al. 2007). Hence, at the intersection of related industries, there are growth opportunities.

The discussion on emergence has an important implication for S3 policy. From the perspective of an individual cluster, emergence may often seem to be a coincidence. However, from a regional perspective, and especially from a S3 policy perspective, this may be less so. From a regional, particularly, evolutionary perspective, the emergence of a new cluster can be considered as a probabilistic event. Some regions will have a higher likelihood of generating new clusters or specialisations of economic activities. The likelihood will increase with the presence of related sectors. The likelihood will also increase if economic activities, and in particular explorative and innovative activities at the intersection between related sectors, are promoted. This links strongly to the idea of S3. S3 emphasises the entrepreneurial discovery process. The idea is that entrepreneurs are best capable to discover interesting, profitable and promising niches. At the same time, a region has limited resources and needs “smart” specialisation. It seems to be “smart” to support the entrepreneurial discovery in the fields that are most likely to lead to the emergence of new clusters. As suggested, this will most likely occur in fields that are related to existing resources, competences, knowledge, technologies, or sectors. On the other hand, entrepreneurial discovery processes in fields where the region does not offer any competitive advantage seem to be doomed to fail or at least success will be highly unlikely.

Having said this, the emergence of economic activities does not always relate to processes of branching or combining competences and knowledge at the intersection between related industries. There are examples where regions have developed vibrant economic activities in new fields. This type of development is frequently referred to as new path creation. Cases for new path creation are for instance the electronics and software industry in Arendal-Grimstad in the South-Eastern part of Norway or the software industry in Mühlviertel Upper Austria (Isaksen and Trippl, forthcoming). These are two cases where new industries have developed in regions that had no preconditions allowing for the above-mentioned branching processes. In these cases, emergence is strongly related to exogenous development impulses backed-up by political support. It remains an open question, how such cases of emergence can fit in a smart specialisation policy framework.

2. Cluster growth

The stage of cluster growth is characterised by a decreasing level of uncertainty and the raise of dominant technologies, designs and industrial players. The transition from the emergence to the growth phase is important from a regional development perspective because the growth of jobs and income is highest in this phase. The phase of cluster growth has been intensively researched and clear policy implications can be drawn. Most research has focussed on the success factors of clusters. Policy measures usually focus on strengthening these factors, including for instance the development of a strong and specialised labour market, the provision of respective educational programmes and courses, the development of research capacities in areas related to the cluster, the development of supporting industries, as well as the establishment of cluster support organisations. These support organisations usually promote formal and informal networks both regionally and

internationally, collaborative projects, or innovation activities. They often also facilitate technology transfer, incubation and spin-offs, or market and promote the region abroad.

From a S3 perspective, a cluster that enters into the growth phase requires attention. Regardless whether a cluster emerged because of an entrepreneurial discovery process, which is central to the S3 approach, or through other mechanisms, the transition from emergence to growth can be considered as a success, or a desired outcome. It can also be considered as the market guidance that should be the basis for a “smart” specialisation strategy. In order to reap the benefits from an economic perspective, i.e. generate as many jobs as possible and create as much income as possible, the growth of the cluster should be supported. This means that the regional accumulation of resources and capabilities that will further strengthen firms located in the region should be facilitated. The existing and proven cluster policies should be valuable also in the context of S3. From a S3 perspective, however, it is always important to remember that the focus will not be on one cluster only but on the realisation of regional development potentials overall.

3. Cluster maturity

The regional development potential may also reside in clusters that have reached the stage of maturity. Maturity means that the growth rate of clusters approaches the average growth rates of an economy. Often these clusters hold an important share of regional employment. Thus, it would not be wise to neglect these clusters in regional policy initiatives. However, regions relying on mature clusters are vulnerable. They are vulnerable because mature clusters often work with mature technologies that can be standardised and the relevant knowledge codified. This will then create opportunities to relocate production to low-cost countries. Furthermore, because of the maturity of the technologies, the innovation activities increasingly shift from radical product innovations to incremental process innovations. Often these clusters are dominated by a few large players and strong, often relatively closed networks. Capital intensive production and high sunk cost additionally reduce the capacity of such clusters to adapt. Cluster policy recommendations for mature cluster usually focus on opening up networks and promoting more heterogeneity in firm competencies (Menzel and Fornahl 2010; Ter Wal and Boschma 2011). How this, however, is done concretely in the context of a S3 approach remains a somewhat open question.

The share of established, mature industries is high in many regions. Also, it could be a costly mistake to assume that every mature cluster will soon decline and disappear. Martin and Sunley (2011) argue that clusters can follow different trajectories and that cluster can also stabilise in a mature stage. Other authors have suggested that the development paths of such clusters can be extended or renewed. The example of tourism, which is characterised as a low-tech industry but which creates many job opportunities particularly in peripheral regions, is relevant here. Given that the natural and cultural resources remain intact, the potential of attracting tourists may remain high in the region. It would seem wise to continue to support the upgrading of the local tourism industry, strengthening service standards, developing new tourism products and improving the marketing capacities. There may well be related sectors in fields such as construction or supporting industries like marketing or ICT services. The question for such clusters is whether a S3 approach would support innovation in the established industries, which does not necessarily contributes to diversification? From the perspective of job and income creation, such innovations may have the largest, immediate impact and are less uncertain and risky because the market environment is very well known to the firms in the region. On the other hand, it may well be wise for a region not to rely on one or few industries only but to diversify. Would a S3 approach focus, therefore, rather on diversification? Or would it do both, and if so, how would the resources be allocated?

4. Cluster decline

Finally, the stage of cluster decline poses strong challenges both for cluster as well as for S3 policy. The decline of a cluster can have various often exogenous sources such as the development of a new

technology that replaces the old one, the standardisation of the technology, which makes it easier to reproduce it in other regions at lower cost, or the raise of a more innovative competition in other regions. In any case, the number of firms and the number of employees strongly decreases. From a cluster lifecycle perspective, such clusters can follow different trajectories such as disappear and die, be replaced by other clusters or be renewed (Hassink 2005, 2010; Martin and Sunley 2011; Menzel and Fornahl 2010; Ter Wal and Boschma 2011; Tödtling and Trippl 2004). Especially the more evolutionary approaches highlight also possible opportunities of decline. In the phase of decline, resources become released from the dominating firms and the dominance of key players in networks declines (Martin and Sunley 2011). Partly, these resources may be of high quality and can be used in different fields. For instance, when a large ICT company faces strong competitive pressures and needs to lay off employees, these may move into new fields such as the development of applications or games. It will have to be seen to what extent such a transformation may result from the restructuring of some of the biggest Scandinavian ICT companies.

The S3 approach potentially can offer a better response to declining clusters than cluster policy. The biggest advantage of the S3 approach is considered to be its regional perspective. While traditional cluster policy focusses on the specific cluster, a S3 approach is wider and emphasises on possible synergies between related fields. Especially in phases of decline, when well trained and qualified resources become released and available on the market, it will be of utmost importance to identify related areas in which these can be productively engaged. This also has to happen relatively quickly because idleness of these resources will quickly lead to skill degradation. The entrepreneurial discovery process can play an important role. As many qualified people get laid off, this is a window of opportunity to explore entrepreneurial activities. Having a secure and well paid job, the opportunity costs of exploring own business ideas are higher. Without a secure job, the expected pay offs and opportunity costs change significantly in favour of entrepreneurial activities. The support of these entrepreneurial activities can at the same time promote renewal. It will be interesting to explore, how a S3 strategy fills this void of cluster literature and how it may support a renewal process. How can new entrepreneurs, released through cluster decline, be supported and how would the networking processes with other actors in related fields be supported?

Limits of the cluster lifecycle approach

Important weaknesses of the traditional cluster lifecycle models, are biological connotations, a deterministic view of cluster development and also the ignorance of firm heterogeneity within clusters. The lifecycle concept implies “some sort of ‘aging’ process. But in what sense can clusters be thought of having ‘lives’ or ‘ageing’ or passing through ‘life stages’?” (Martin and Sunley 2011, p. 1300). It may be difficult to know in what stage a cluster currently is in and clusters don’t necessarily follow each stage consecutively. As for instance Martin and Sunley (2011) argue, there are at least six trajectories that a cluster may follow. Some may indeed follow a stylised lifecycle. Others may continue to mutate and remain for a long time in the growth phase. This is often associated with clusters that build on general purpose technologies. Other clusters stabilise after maturation and continue to be competitive through incremental innovation activities. Some clusters do decline and disappear, while others renew themselves or get replaced. Hence, even though it is very powerful, the concepts of path-dependency and lock-ins have received some criticism. Hassink (2010) shows, for instance, that old industries like steel and textiles can develop very differently and that there are many economic-structural and institutional-political impact factors operating at multi-levels. The interplay of these various factors is crucial for an industry’s development. Strambach (2010) illustrates that despite institutional rigidities, firms do explore and experiment within the existing institutional framework by reinterpreting institutions or combining different institutions. She shows that these processes can lead to the raise of new industries in an environment that is not particularly conducive for the specific sector, such as business software in Germany. We still know fairly little about how the S3 approach takes into account these institutional underpinnings that support the growth of industries.

In summary, cluster policies and the S3 approach partly overlap and are partly complementary to each other. Clusters policies, cluster experience and cluster research has led to a rich body of theoretical, conceptual and empirical literature. Factors driving the success of clusters are well-known. Also, reasons that may lead to an eventual decline of clusters are well researched. Policy experience has been gained about which policy tools support the development of clusters and also what can be done to counteract situations of lock-in. However, the broad, regional perspective of S3 has some distinct advantages over the cluster approach. These advantages relate particularly to stages that are less well served by the cluster approach such as cluster emergence or cluster decline. However, comparing the cluster approach with the S3 model raises several questions that require more attention such as how to allocate resources when there are different clusters in a different development stage or as to what extent mature clusters should be supported compared to support for economic diversification.

Public procurement for innovation and S3

Using public procurement for innovation is an idea that has received increased attention in policy circles in the last years due to two main factors. First, as mentioned above, because it belongs to the category of demand side policy instruments, which have been under focus lately. Second, in a context of budgetary constraints, it is easier for regions to implement a tool such as public procurement, which does not require increases in public budgets per se.

Whereas public procurement refers to the purchase of goods and services by a public authority, public procurement for innovation (PPI) puts the government as a “lead customer” for an innovative product or service (European Commission 2007). This leads to several benefits, such as economies of scale due to substantial early purchases, reduction of costs in products and improvements in quality due to learning effects as well as learning in use benefits (Mowery 2012).

Public procurement for innovation is an evolution of the earlier concept of “public technology procurement” (Edquist et al. 2000): it has been extended to innovation policy and associated to several application areas such as e-Health, Pharmaceuticals, Energy, Environment, Transport and Logistics, Security and Digital Content (Edler and Georghiou 2007 p. 951).

Public Procurement for Innovation could be defined as the process by which a “public organization places an order for the fulfilment of certain functions within a reasonable period of time (through a new product)” (Edquist and Zabala-Iturriagoitia 2012, p.1758). Therefore, the main objective of this process is to enhance innovation and new developments, always linked to societal challenges or needs. That is to say that PPI is an instrument that can be related to new mission oriented policies or to S&T thematic priorities, instead of functional ones (Gassler et al. 2004): this opens up the possibility to relate PPI to smart specialisation strategies (Navarro et al. 2013).

There are different types of public procurement for innovation, according to the literature (Edler 2009; Uyarra and Flanagan 2010; Edquist and Zabala-Iturriagoitia 2012). These can

be categorized according to two main dimensions: the user of the innovation which is procured; and the result of the procurement process. According to the first dimension, there are two types of PPIs (Edquist and Zabala-Iturriagoitia 2012):

1. Direct PPI, the user of the procured innovation is the agency that starts the procurement process, and therefore the needs to be fulfilled by the PPI are located in that agency and;
2. Catalytic PPI, when the agency acts as a catalyst and therefore the end user is located outside the agency. This last type of PPI is more related to entrepreneurial discovery processes as it could act as a catalyst of these processes in the region.

With respect to results of the procurement process, three types of PPI can be identified:

1. Pre-commercial procurement in which there is no product development involved but the procurement is a matter of direct public R&D investments (normally involves the development of a prototype).
2. Adaptative PPI, when the result (product) of the procurement is only incremental and new to the country or region;
3. Developmental PPI, which is related to radical innovation and the result is new to the world.

Whenever any type of PPI can be related to a certain regional S&T priority, then it becomes a potentially useful policy tool for smart specialisation strategies. However, certain barriers and challenges should be considered by the regions before implementing this tool in the context of S3.

First of all, there is no specific regulation on public procurement for innovation and the European regulation treats this type of procurement in the same way as regular public procurement, which leads to difficulties in terms of its implementation and results.

Secondly, public procurement for innovation requires government capabilities as the product to be purchased is not yet developed: those capabilities differ from the ones required for regular purchases. Officials in charge of these purchases normally lack the competences required to implement innovation procurement processes (and tend to be risk averse) and therefore developing these capabilities is essential (Edquist and Zabala-Iturriagoitia 2012). In some countries where regional governments do not make use of procurement processes to the same extent as national ones, this lack of capabilities could be even greater at regional level than at national level, this creating a hurdle for using PPI in regionally-based S3.

Thirdly, it is important to understand that the first stage of PPI processes, i.e. defining the societal needs or mission, should be linked to entrepreneurial discovery processes and therefore engaged with the different actors within the region.

Finally, PPI are part of a policy mix. That is to say that procurement effectiveness for enhancing innovation should be accompanied by other measures from the supply side (such

as R&D direct funding), as some authors such as (Edquist and Zabala-Iturriagoitia 2012) have highlighted.

Summarising, even though PPI can be a useful tool for enhancing and catalyzing innovation in the private sector in certain fields and hence contribute to S3 goals, this instrument should be combined with other instruments and regional authorities should develop capabilities in order to effectively manage and implement this tool.

3.4. Challenge 4: The “multi-level governance” challenge

Multilevel governance issues are widely recognised today as adding a significant element of complexity to the design and implementation of innovation policies, something that is relatively new given the previous predominance of the national level in most policy areas (Hooghe and Marks 2001). While the phenomenon of globalisation is commonly associated with a ‘de-territorialisation’ of socioeconomic relationships (Scholte 2000; Sugden and Wilson 2005), the globalisation of markets has in fact been accompanied by an increase in consciousness around the importance for innovation and competitiveness of proximity-based relationships that are firmly rooted in regional and local systems (Storper 1997; Cooke et al. 1997; Cooke and Morgan 1998; Scott 1998; Morgan 2004). This has corresponded in practice with a decentralisation in the governance of innovation policies in many places, with certain competences shifting from national to regional and local levels. At the same time there has also been an extension of certain policy competences at supra-national levels in some parts of the world, for example the European Union. The result is that innovation policies are today designed and implemented from several different administrative scales – city, region, national, and supra-national. While some policies are more commonly found at national and supranational levels (i.e. science and R&D policies that need greater concentration of resources) and others more suitable for regional and sub-regional levels (i.e. networking policies that rely on proximity) (Koschatzky and Kroll 2007; Koschatzky and Stahlecker 2010), in practice a wide range of innovation policies are implemented at all levels. Many regions and countries fund and use similar policy instruments and face the challenge of organising complementarity in their operation (OECD 2011).

This situation creates the risk of a governance gap between the different levels of innovation policy (Kuhlmann 2001), and is likely to lead to overlaps among policy initiatives. This has stimulated an increased interest around *the multilevel dimension of policy mixes* (Flanagan et al. 2011, OECD 2011) and the challenges that this implies for policy coordination and evaluation (Navarro and Magro 2013; Magro and Wilson 2013). The OECD enquiry on multi-level governance for innovation policy highlighted numerous challenges for achieving vertical policy synergies (OECD 2011):

- Lack of recognition of regional STI priorities or assets in national policy approaches;
- Difficulty to map and coordinate funding sources and actions from different levels of government, insufficient incentives for policy co-ordination across and within levels;
- Proliferation of public support programmes (transactions costs, complications for target groups);
- Weak intensity in information sharing on policies across levels;

- Unequal capacities in policy-making circles between the various levels;
- Policy silos at one level hindering coordination at another level;
- Gaps in innovation policy responsibilities across levels.

S3 strategies are normally defined at and for the regional level, but must be implemented using a range of innovation policy instruments that are likely to ‘belong’ to a mix of different administrative levels: these multilevel governance challenges are thus particularly relevant for the implementation of S3. The key questions become: how do strategy design and implementation processes take the multi-level governance into account? For example, what effects might State Aid rules have on the actions undertaken at a regional level?

Literature distinguishes between two modes of coordination that are related to S3 policies: the vertical and the horizontal one (OECD 2010; Magro et al. 2013). Vertical coordination refers to the coordination with other administrative levels (namely, the state and the European Union) while horizontal coordination refers to the coordination within the region (i.e. coordination between policy domains within the region and with other sub-regional levels, see the “policy mix” challenge above). Deploying S3 also poses some challenges with regards to coordination within the ‘functional region’ such as coordination in cross-border regions, which can be referred to as lateral coordination mechanisms (see the “cross-border challenge” below).

To sum up, *vertical coordination mechanisms should co-exist with horizontal and lateral mechanisms* to ensure efficient and integrated policies. In terms of coordination with the State and European Union, formal mechanisms are put in place in many regions although informal and not compulsory mechanisms are being defined and implemented as a consequence of the definition of S3.

3.5. Challenge 5: The “cross-border collaboration” challenge

A key issue for S3 is the question of the *appropriate territorial unit* to take into consideration for the design and the implementation of S3 policies. Regional innovation policies are usually constructed for political-administrative regions, whilst innovation-relevant interactions and knowledge flows seldom respect administrative borders but go well beyond them, creating *functional regions for innovation*, based on a high density of knowledge exchange and innovation-related interactions among actors (OECD 2013b). Interregional and cross-border collaboration are thus an essential challenge in the S3 policy process, in particular with respect to the implementation of S3 policies.

S3 is about the identification of smart specialisation domains that are internationally competitive, that is, combinations of complementary activities and knowledge bases which usually transcend regional borders. S3 policies hence need to focus on those domains, that are unlikely to be “contained” within regional administrative boundaries. This points to the need to see interregional or cross-border cooperation as an integral part of S3 (European Commission 2012a). The recent debate on cross-border innovation systems (Trippel 2010, Lundquist and Trippel 2013) and cross-border innovation policies (OECD 2013b) highlights that a number of strong rationales for supporting cross-border collaboration exist, ranging

from economies of scale (critical mass in labour markets and industries which allows intensified specialisation) to economies of scope (complementarities due to diversity in research, technology, and economic base between partners from each side). The OECD report on cross-border regional innovation policies suggests that the power of “new combinations” (of skills, assets, knowledge base, industrial specialisations, etc.) leading to the development of innovative activity domains is potentially large when actors from regions from different national contexts, still operating in proximity, are collaborating, thus *exploiting the advantages of both diversity and proximity* (OECD 2013b). This is well in line with the goals of S3.

Consequently, cross-border collaboration has the potential to be a powerful approach to deal with several key challenges of S3, i.e. (see section 2.2):

- Fragmentation and duplication of public investment for R&D and innovation within and across regions;
- Lack of critical masses for innovation activities in regions, deficiencies in building and hooking to external knowledge networks.

Thus, it is fundamental that the cross-border issue is considered thoroughly in the S3 policy process in order to exploit the potential for smart specialisation also across national boundaries in the European regions.

Key questions such as how to organize S3 beyond political-administrative boundaries, how to align policy instruments across border regions, how to fine-tune policy mixes, and how do set up funding of organizations and programmes at a cross-border level (see OECD 2013b for an empirical account and an in-depth discussion), etc. require in-depth consideration.

Whilst there are many arguments in favour of cross-border S3, their implementation can be a demanding and difficult endeavour due to a variety of reasons:

- Many regions have experiences, accumulated knowledge, procedures and practices in constructing regional innovation policies and strategies on their territories but not on a cross-border level. Breaking-out of traditional, inward-looking policy routines and path dependencies is a key prerequisite for S3 to work;
- Interregional and cross-border collaboration is hampered if regions that form a cross-border area differ in their formal power and policy capacities (i.e., resources and skills existing within the policy system or made available to policy actors). This might lead to an unbalanced implementation of S3 across the transborder region.

Below, we lay out a number of key aspects of the implementation of S3 with regard to cross-border regions.

Separate cross-border S3s?

An initial question to consider is the status of cross-border S3s, relative to the S3s of the administrative regions. The cross-border S3s can either 1) be individual strategies on top of the regional S3s, 2) replace regional S3s in the administrative regions they cover, or 3) be

part of the regional S3s, perhaps as a designated chapter. Each of these options has benefits and drawbacks.

- Individual strategies will provide the greatest opportunity to go in depth with the cross-border innovation issue; however, there is an immediate risk that such individual strategies will be detached from the main S3s, resulting in limited impact;
- Cross-border S3s as a replacement of S3s for administrative regions has the advantage that strategies will be allowed to follow functional regions, thus, targeting economically relevant areas; however, this is unlikely to be a politically feasible option and it also raises the question of the delimitation of the regions, as discussed below;
- Finally, including cross-border collaboration as a designated chapter in the regional S3s ensures that this issue is considered in all S3s; however, there is a risk that it will become a part which is only included due to formal requirements and which is therefore poorly integrated into the overall strategy.

The institutional situation of the region(s) and the stage of cross-border RIS building are amongst the key determinants of which of these three options should be applied.

Cross-border S3s for some or for all border regions?

A related issue is whether cross-border S3s are a sound strategy for some or for all border regions. On the one hand, it can be argued that it is potentially beneficial for both advanced cross-border regions (e.g. Øresund, where cross-border activity is of economic importance), and weakly integrated, unbalanced regions where access to resources across the border may in fact be crucial for a successful S3. On the other hand, the observations that some cross-border partnerships are in reality “grant coalitions” (Church and Reid 1999, p. 645), and that today some of these areas are mainly “regions on paper” (Paasi 2002, p. 200) point to danger of extending the cross-border S3 process to too many areas where limited potential for fruitful cross-border collaboration actually exists. This highlights the importance of cross-border S3s founded on thorough analysis of: current level of cross-border interaction, and possible benefits of increased interaction (assessment of the potential for strategic fit between neighbouring border areas). The OECD study proposes a list of ten conditions to check to assess the potential of a cross-border territory to become a functional region for innovation (Table 4).

Table 4. Ten conditions for assessing the cross-border environment

FRAMEWORK CONDITIONS	
1. Geographic accessibility	Internal and external accessibility of the cross-border area/integration
2. Socio-cultural proximity	Similarities in language, culture, practices and values as well as a sense of shared identity
3. Institutional context conditions	Level and degree of similarity in regional competences for economic development and in laws, regulations, tax systems, etc.
4. Cross-border integration	Flows of workers, goods (market and supplier links), FDI, etc. across the area as well as harmonisation of price levels, production costs
INNOVATION SYSTEM CONDITIONS	
5. Economic specialisation	Proximity and complementarity both in industrial structures and knowledge bases (also known as “related variety” and “proximate diversity”)
6. Business innovation model	Innovation-based business strategies with open innovation practices, as opposed to low-cost competition strategies
7. Knowledge infrastructure	Quality of research and educational organisations and their engagement with the regional economy
8. Innovation system interactions	High density and balanced cross-border interactions across innovation system actors
GOVERNANCE AND POLICY CONTEXT	
9. Governance	Degree, longevity and institutionalisation of political and financial commitment to cross-border collaboration
10. Policy mix	Orientation of innovation policy as well as the cross-border policy instruments

Source: OECD (2013b) inspired and expanded from Trippel, M. (2010).

As noted by the OECD report (OECD 2013b), the current lack of data is a substantial problem which currently inhibits the development of evidence-based policies. Another relevant remark in the report is that private actors are often the first to see the potential for cross-border collaboration, thus, in the absence of other indicators, the cross-border activity of private actors could potentially be used as an indicator for further cross-border collaboration potential. However, there are also indications that designated cross-border policies aimed at strengthening cooperation are necessary in order to stimulate the cross-border collaboration of individual actors (Hansen 2013). This points to the importance of cross-border policies in initiating integration processes.

The content of cross-border innovation policies: all or some parts of the cross-border RIS?

A third important aspect of the implementation of S3s in cross-border areas is concerned with the content of cross-border innovation policies. Following Trippel (2010) and Lundquist and Trippel (2013) a distinction can be made between six central dimensions in the creation of transboundary knowledge spaces: knowledge infrastructure, business characteristics, nature of relations, socio-institutional characteristics, governance and accessibility. Thus, an important question is if cross-border S3s should necessarily deal with all aspects of the cross-

border RIS, or just those which appear central in the given context? One argument in favour of the former approach is that such a framework would ensure that all the dimensions are at least considered in the individual strategies. The emphasis may then, naturally, be different from one cross-border region to another, however, the interdependency of the six dimensions is generally acknowledged. To exemplify, investments in infrastructure and accessibility do not necessarily have positive effect on cross-border collaboration by itself, but needs to be supplemented with policies focusing on cross-border collaboration (e.g. Hansen 2013).

Fixed or fluid cross-border regions?

As noted above, the delimitation of the cross-border regions is a key aspect. Basically, this raises the question of whether cross-border regions should be fixed or remain fluid. The OECD report (OECD 2013b) makes a convincing argument that there is a need for letting the delineation of the cross-border regions vary over time and according to the concerned activity. Firstly, this prevents the building of new borders and, secondly, it allows policies to be sensible to differences in the geographical patterns between, e.g., different industries. A fluid approach to the delimitation of cross-border regions points in favour of developing cross-border S3s as parts of the regional S3s (see above).

3.6. Challenge 6: The “smart policy-making” challenge

The transformation of the Smart Specialisation idea into a policy concept calls for *new policy intelligence*, to be deployed *at all steps of the S3 policy cycle*. Assessing smart specialisation strategies is, from this point of view, a vital component of the cycle, which ensures a feedback loop from implementation to design. Research on the “smart policy-making” challenge aims at analysing conditions and developing methods to ensure that the strategies are reaching their intended goal: supporting economic transformation in regions, by building on, and developing knowledge-based competitive advantages.

Developing and using *more and better policy-relevant evidence* is key in solving problems found at all stages of policy-making, such as:

- At design stage: risk of capture by vested interests, too vague prioritization, irrelevant priorities, inward-looking approaches, political reluctance to long-term approaches;
- At implementation stage: unbalanced, inefficient, incomplete policy mix; inertia in policy mix; lack of consideration of cross-border dimension in policy;
- At assessment stage: lack of efficiency and effectiveness of policy.

All the above challenges address the issue of smart policy-making at various points in the S3 policy cycle. Supporting smart “prioritization” with the appropriate “involvement of stakeholders” and based on a sound SWOT analysis of regional assets, requires analytical tools and policy-relevant evidence at S3 design stage. Establishing and deploying appropriate “policy mixes”, “multi-level governance” arrangements and “cross-border cooperation” practices, involving a whole set of new evidence and methods, are at the heart of the smart-policy-making questions at implementation stage. And how to monitor and evaluate S3 policies in view of their higher effectiveness is the overall key question for smart policy-making at assessment stage.

According to the recent OECD smart specialisation study, the following issues are the most relevant to evolve towards “smarter S3 policy-making” (OECD 2013a):

- “Development and testing of robust tools to conduct strategic analyses with the view to identify smart specialisation “niches” (rather than broad activity domains, which tend to be too similar across countries and regions);
- Mutual learning and expert support to improve the stakeholders involvement process and the interlinkages between quantitative and qualitative inputs into strategy formation process;
- Development of impact-oriented monitoring and evaluation systems specifically geared to S3 goals (in complementarity with generic monitoring and evaluation systems, which need improvement). These systems should point the way towards exit strategies for policies;
- Pilot exercises on implementing “S3-oriented” public budget pictures, as an effort to make the S3 concept more tangible”.

Here we focus on the last two issues, encapsulated under the *monitoring and assessment* questions, which are at the core of the assessment stage of the S3 policy cycle. Both the production and the use of policy-relevant evidence through monitoring and evaluation are essential elements for experimental policies such as S3 policies. The last challenge below, “policy capacity” (section 3.7), deals more specifically with the *use* of policy-relevant evidence, while here we discuss the issue of *production* of policy-relevant evidence.

Below we briefly discuss various questions around S3 assessment: why is it necessary; what is to be assessed; when to assess; what the assessment questions are; and how to assess. The next challenge (challenge 7 “policy capacity” challenge) will address the intimately linked question of how to integrate lessons from assessment into the policy cycle.

Why do we need to evaluate S3?

Justifying the need for evaluation of policies might seem superfluous. However, evidence tells us that, in practice, only 20% of regional innovation policy instruments are evaluated (Regional Innovation Monitor 2013). And the costs involved by monitoring and evaluation is frequently used as an argument against the deployment of such mechanisms.

To ensure that a policy produces desired outcomes, there is a need to shift from naïve (and false) measures of “success”, which are very commonly used in policy practice, such as:

- Funds consumption;
- Anecdotic evidence or specific success stories;
- Reports on successful outcomes which are not checked against selection biases or deadweight losses (and hence not likely to respond to the additionality requirement).

Pressure to demonstrate value for public money is mounting, more so for “new” policies

In a context of competing demands for public funds and mounting public debts, demonstrating relevance and value added of specific policies becomes a necessity in almost

all fields. The pressure to demonstrate value for money rises, and this applies to a greater extent to “new” policies, such as S3. Thus, *accountability* is likely to be a central consideration for S3 policies.

There is a high degree of path dependency in policy, both at decision-making and operational levels. To break the inertia caused by path dependency tendency, there is a need for evidence that shows the relevance of the changes in perspective brought by S3.

While innovation as a “new” policy field has progressively gained support over the last two decades in most EU countries and regions, the content of such policies is however not subject to a wide consensus. Linear views, involving a concentration of support to research activities, are competing with systemic and demand-oriented approaches, involving very different policy rationales and contents, and targets ranging from very narrow to very broad notions of innovation. S3 intends to support a new agenda for regional innovation policies, with prioritization on knowledge-based activity domains where a critical mass of actors in the region hold specific assets, and identify important market perspectives. This prioritization implies a shift in policy actions, to increase the support to priority domains and phase out support to others: this creates *changes in balances of power*, which generate needs for justification of the relevance and effectiveness of the new policies. By definition, S3 priority domains will not correspond to sectors traditionally defined, around which representation tends to be organised. The new, emerging, cross-sector fields of activities that are under focus in S3 often lack formal representative bodies of stakeholders.

Policies with an experimental character need to be coupled with learning mechanisms

S3 is a new idea which, as mentioned above, is still in need of proof of concept: this increases the need for evaluation, not only for ensuring effectiveness but also from a theoretical point of view, ensuring learning. Thus evaluations will need to address *two purposes: accountability and learning*.

When translated into policies, S3 entails experimental approaches: there is no established best model for policies associated to S3, tailor-made choices have to be made. Within the context of new orientations, lessons from past policy approaches might not be sufficient to ascertain the value and effectiveness of S3 policy mixes. This creates an intrinsic need for careful *monitoring of outputs and evaluation of impacts* of policy actions, to provide the necessary knowledge for fine-tuning policies.

Experimental policies involve *risky* choices, so errors are part of the process. This creates a policy context where the goal is not to completely avoid failure but rather to be able to recognise failures in choices and withdraw from them. Thus the *development of “exit” strategies*, based on evidence from monitoring and evaluation, are part of S3.

One of the key challenges addressed by S3 is the move towards outcome-driven policies

Weak strategic approaches and a lack of outcome-driven orientation of policies have been reported as one of the main shortcomings in contemporary regional innovation policies, to

which S3 is expected to provide a response (see section 2.2). The integration of S3 as conditionality for accessing EU Structural Funds is related to the unsatisfactory results of past regional development policies within the EU. Thus, S3 enshrines the ambition for such policies to become much more outcome-driven (Box 3).

**Box 3. Evolution towards outcome-driven policies:
one of the 10 points in the reform of EU Cohesion policy**

Point 3. Fixing clear, transparent, measurable aims and targets for accountability and results: Countries and regions will have to announce upfront what objectives they intend to achieve with the available resources and identify precisely how they will measure progress towards those goals. This will allow regular monitoring and debate on how financial resources are used. It will mean additional funds can be made available to well-performing programmes (through a so called "performance reserve") towards the end of the period.

Extract from European Commission MEMO/13/1011 of 07.11.13: "Refocusing EU Cohesion Policy for Maximum Impact on Growth and Jobs: The Reform in 10 points"

This need for evaluation of outcomes and impacts is of course not restricted to the S3 approach. Experience with regional innovation policies in the past shows that there are cases of policies with little impact which remain in place, as well as of policies with large impacts not being scaled up. All in all, the lack of knowledge on policy impacts of regional innovation policies is a remarkable feature, which has been pointed out repeatedly, and to which S3 needs to provide a good answer.

What are we evaluating?

Policy mixes for S3 are the subject of evaluation

The question at stake here is that of *policy assessment*, not innovation (eco)system assessment, nor strategy assessment. Assessing the state and potential of the regional innovation eco-system, and questioning the relevance and process of strategy development, are two other important issues that need to be integrated in a S3 process. The question of relevance of S3 orientation to achieve regional economic transformation, along with a sound SWOT analysis of regional innovation potential, will be analysed in WP1 where the focus is on the entrepreneurial discovery process, and the role of actors in discovering new pathways for regional development. Here the focus is on the policies that are in place and translate the strategic orientations into policy action.

The target of policy assessment is the *policy mix for S3*, as defined above, and taking into account the multi-level and cross-border dimensions (challenges 3 to 5 above). This concept is not easily reconciled with reality: in practice, the portfolio of policies that are relevant for implementing a S3 are more likely to be implicit than explicit (OECD 2013a). Hence the evaluation has first to define the range of policies (from different policy domains and government levels) that together feed the strategy. Some regions may consider "S3 policies" in a narrow sense, limiting them restricted, experimental new policies specifically designed in the wake of S3 adoption. The hypothesis in this research is on the contrary that a wider set of policies are to be assessed for their contribution to the S3 goals. This covers policies:

- Falling explicitly under S3 or not;
- From a variety of policy domains (see challenge 3);
- From different levels of government (see challenge 4);
- Covering existing as well as new policies.

Policy mix evaluation is different from traditional policy evaluation in two respects:

- The evaluation targets a *system of policies* and looks at interactions between various policy tools traditionally investigated separately ;
- The evaluation places a focus on *strategy process*, where the roles of various stakeholders, beyond policy-makers only, are recognised as important. This opens up towards methods that include participative evaluation techniques.

The goal is regional economic transformation but also social innovation

Policy mixes for S3 are implemented with a view to contribute to the overall goals of S3, i.e. transform regional economies towards more international competitiveness while addressing societal challenges, through the exploitation of distinctive knowledge assets. This is the objective against which the policies need to be assessed, and, to be meaningful, the objective has to be expressed into detailed goals.

The broadening of innovation concept to include social innovation deserves a particular attention in terms of integrating indicators reflecting social innovation not only in goals definition but also in monitoring and evaluation of S3 policy mixes. This aspect will be covered in WP2 of the SMARTSPEC project.

When to assess?

Assessment is to be planned ex ante and conducted on an ongoing and ex post basis

As mentioned above, a hypothesis for work under this WP4 is that the various components of a S3 policy cycle need to be considered simultaneously rather than purely sequentially. This implies, in particular, that the *assessment element needs to be integrated in the design of a S3*, and right *from the start of implementation* of S3-related policies. This takes the form of:

- Targets in terms of evolution of smart specialisation domains (quantitative and qualitative growth and competitiveness indicators, methods to study the long-term evolution of innovation ecosystems);
- Monitoring mechanisms (indicators, collection and analysis procedures) associated to policy mix elements;
- Evaluation procedures, indicators and methods both for specific elements of the policy mix and for the policy mix as a whole (systemic evaluations and meta-evaluations).

While ongoing assessments aim at fine-tuning and revising policies within a given S3 framework, ex post assessments have the purpose to feed strategy revisions at certain time intervals.

What are the assessment questions?

Two key questions: policy mix relevance and effectiveness

Two principal and complementary questions need to be addressed in S3 policy mix assessment¹:

1. The *relevance* question: are the orientations and content of S3 policy mix appropriate to drive the regional economy forward? This is the most fundamental question, as it puts under scrutiny the overall design and the priority choices that have been made at the heart of the S3. This question needs to be treated some time after the start of the implementation of S3, when effects will have had time to materialize. Analysis of relevance faces a typical evaluation problem, the *time lag issue*;
2. The *effectiveness* question: is the implementation of S3 done in such a way that the intended goals are reached? This question can be analysed sooner after the start of the implementation of S3. The effectiveness issue looks at whether the programmes, actions, initiatives part of the S3 policy mix are implemented effectively. Implementation failures can come from ill-designed policies, or from more concrete deficits in the implementation. Based on analysis of results and impacts of policies, it queries whether the objectives formulated in the strategy have been achieved or at least whether there has been significant progress towards them. Analysis of effectiveness is faced with the difficulty to isolate the impact of S3 policy mixes from other factors that have influenced the evolution towards the objectives (the *attribution* problem).

The first question aims at detecting and avoiding *design failures*, while the second one targets *implementation failures*. Those are two different potential sources of failures for S3 to reach their intended goal of regional transformation.

Arguably, the question of efficiency (the check for a reasonable balance between resources invested and results obtained, or the return on investment) is another important question for evaluation. Since the two above questions are preliminary to the efficiency question, research in WP4 will focus on the former.

With respect to the relevance issue, a fundamental question is whether all necessary conditions are taken into account for a specific specialisation domain to flourish. Typically, supporting technological developments in specific areas is insufficient if the necessary organizational and institutional changes are not evolving at the same time. Economic transformation towards new growth domains will often involve dramatic changes in terms of new skills set, new managerial practices, other types of user involvement, etc. which need to be taken into account in the design and operation of policy mixes.

¹ The two questions relate closely to the two typical questions for policy evaluation: 1) are we doing the right things? and 2) are we doing those right things right?

A starting point for conducting such evaluation of relevance could be to look at key activities in innovation systems, and identify where, and what kind of policy action is needed to remedy some failures (Box 4).

Also, achieving alignment of various actors' agendas towards S3 goals is a necessary condition, for which the right incentives need to present in policy action.

Box 4. Key activities in systems of innovation

(i) Provision of knowledge inputs to the innovation process

(1) Provision of R&D results and, thus, creation of new knowledge, primarily in engineering, medicine and natural sciences.

(2) Competence building, for example, through individual learning (educating and training the labor force for innovation and R&D activities) and organizational learning. This includes formal learning as well as informal learning.

(ii) Demand-side activities

(3) Formation of new product markets.

(4) Articulation of new product quality requirements emanating from the demand side.

(iii) Provision of constituents for SIs

(5) Creating and changing organizations needed for developing new fields of innovation. Examples include enhancing entrepreneurship to create new firms and intrapreneurship to diversify existing firms; and creating new research organizations, policy organizations, etc.

(6) Networking through markets and other mechanisms, including interactive learning among different organizations (potentially) involved in the innovation processes. This implies integrating new knowledge elements developed in different spheres of the SI and coming from outside with elements already available in the innovating firms.

(7) Creating and changing institutions—for example, patent laws, tax laws, environment and safety regulations, R&D investment routines, cultural norms, etc.—that influence innovating organizations and innovation processes by providing incentives for and removing obstacles to innovation.

(iv) Support services for innovating firms

(8) Incubation activities such as providing access to facilities and administrative support for innovating efforts.

(9) Financing of innovation processes and other activities that may facilitate commercialization of knowledge and its adoption.

(10) Provision of consultancy services relevant for innovation processes, for example, technology transfer, commercial information, and legal advice.

Source: Edquist 2011

How to evaluate?

Monitoring and evaluation activities need to develop concrete indicators which capture the intended transformation goals of S3 and can be linked to specific policy instruments. This requires appropriate (realistic, measurable, robust...) metrics, targets and indicators.

Here the focus is placed on effectiveness, where a first task will often be to *reconstruct the intervention logic* of policies that might not have been explicitly framed into an S3 context.

There is a need to develop new methods, indicators and tools adapted to S3: what implications for traditional monitoring and evaluation approaches when applied to S3?

A combination of various techniques is relevant:

- *Quantitative* indicators and methods. Starting from proven and academically sound methods, how to adapt them to the S3 context? How to incorporate the “change” factor? Social innovation goals? Which indicators?
- *Qualitative*: interviews; focus groups...; Peer review method...Participatory evaluation (mobilization of regional communities, empowering regional change agents...)

Key issues in S3 policy evaluation

- How to define indicators that measure change and *capacity* for change? Organisational, institutional, cultural changes?
- Move from individual policy instruments evaluation to policy mixes evaluations
- The timeframe issue
- The attribution problem
- Specific challenges for less favoured regions
- ...

3.7. Challenge 7: The “policy capacity” challenge

The question of developing policy intelligence tools is intimately linked to that of policy capacity, i.e. resources, skills, culture and organisational changes to be developed within policy-making circles, or made available to them, in a learning perspective: both production and *use* of policy-relevant evidence are necessary for S3 to be effective. The questions of policy capacity and policy learning are important at all stages of the S3 policy cycle, and in particular at assessment stage.

Weak policy capacities are likely to constitute an important hurdle for the success of S3: in the past, an “innovation paradox” has been identified, in which regions most in need of sound regional innovation strategies were actually the ones less invested in such strategies (Oughton et al. 2002). The weak policy capacity in less developed regions is one explanation for this paradox.

The use of evidence for policy: the policy learning question

As argued by Borrás (2011), despite the importance of policy learning for innovation policy, studies of policy learning in this area are scarce, and our understanding of the phenomenon is at best patchy. She refers to policy learning as “the specific process in which knowledge is used in the concrete development of policy formulation and implementation... and is a consequence of a specific intentionality towards problem solving” (Borrás 2011, p.727). This does not deny that policy changes and policy transfer are in practice possible without policy learning (e.g. through pressure of interest groups, or naïve benchmarking practices).

The effectiveness of use of policy-relevant evidence (produced notably by monitoring and evaluation activities) within the S3 policy cycle is likely to depend on several features:

- Who produces the evidence, how is it made available to, and accessed by policy-makers?

- What kind of evidence (qualitative, quantitative, synthetic, detailed, codified, tacit...) do policy-makers use?
- How do policy-makers learn? Through internal or external processes? Within their own context or through inter-regional or international exchanges?
- What kind of barriers do policy-makers face when trying to develop learning practices: rigid budget planning practices, organisations working in silos, lack of budgetary resources, lack of human resources, lack of political commitment, etc. ?

Nauwelaers and Wintjes (2008) have proposed a categorization of six policy learning modes in the field of innovation, distinguishing between the type of knowledge used (codified or tacit) and the level of policy learning (within own organization, across organization in the same policy system, or between policy systems) (Table 5). All these modes have their strengths and weaknesses. In a given region, in practice, several or all modes of learning will be activated at the same time, and the question becomes that of the best combination of the different modes.

Table 5. Modes of policy learning in innovation

Policy learning levels versus knowledge base	Intra-organisation learning In policy-making / implementing institution	Intra-system learning With users/partners in innovation	Inter-system learning Between different regions/countries
Tacit knowledge	Experience, learning-by-doing, learning curve, intra-organisational	Inter-organisational learning, people mobility, sharing visions	International discussions, peer reviews, mobility exchanging experience
Codified knowledge	Internal monitoring; budgetary, administrative, targets	Evaluations, National/regional Monitoring and evaluation system	International benchmarks, using (policy) scoreboards, databases

Source: Nauwelaers and Wintjes 2008

Path dependency in policy-making processes

Path-dependency and inertia are key features of policy-making processes and instruments. These features constitute strong countervailing powers to policy learning processes, geared towards change. Path-dependency is a concept that recognizes that history matters in regional development. This issue needs to be taken into account in policy-making processes, including the design and implementation of S3. It is explicitly acknowledged by Foray (2013) that any prioritisation of vertical activities that favour certain technologies, fields, and therefore firms, is difficult to justify. One of the key reasons for this difficulty is that the policy mix in a region has typically evolved over a sustained period of time, generating expectations of support from certain subsets of firms and agents that reflects the conscious or unconscious priorities of past strategies. However, policy path-dependency does not only provoke lock-in situations, but also can change trajectories (Boschma 2005), and therefore it is an element to consider in the implementation of S3.

We can identify three elements of change in path dependency trajectories, which are layering, conversion and recombination (Fuchs and Waserman 2005). That means that institutions as well as public policies can be totally new, they can be a conversion from some policies from the past or a recombination of different instruments. These three elements can also be identified in innovation policies and instruments and are useful elements for improving the understanding of regional policies' paths and elements to take into account in the implementation of S3. For S3 to be successful, emerging priorities will need to be supported by a re-orientation of policy resources, which implies a change of the status quo for many agents.

To overcome policy inertia and unlock the potential for supporting newly emerging prioritizations, it is important to understand specific challenges with respect to communication, leadership, and the development of broad-based participatory dynamics capable of generating focused consensus. It is here that robust policy learning processes are definitely a key feature of successful S3s.

Peer reviews

Peer reviews deserve particular attention as methods for assessing overall S3 processes and building up policy capacity. When deploying their full potential, they offer the benefit of combining the exploitation of both quantitative and qualitative information, internal and external learning, and a translation of results into policy-relevant recommendations. In complex policy fields such as innovation policy, they tend to be used widely for these reasons. They are notably used by the OECD for national and regional innovation policy reviews (OECD 2009 and 2011).

Peer reviews of policies are methods that incorporate the following five features (Nauwelaers and Wintjes 2008):

- Voluntary engagement: both the reviewers and the reviewed actors decide to undertake the exercise, on the basis of their genuine interest;
- Policy-oriented approach: peer reviews go beyond pure analysis as they aim at improving policy practices;
- Reciprocity and shared interest of all parties towards the exercise: normally, the same actors would be likely to act as reviewed or reviewers at different occasions;
- Frequent presence of an intermediary, neutral organization (such as the OECD Secretariat), acting as an organizer of the exercise (playing sometimes a heavier role in analytical work);
- A three-phase process, consisting in a preparation phase (background analysis by the reviewed country/region), a consultation phase (dialogue and analysis between reviewers and reviewed, often including visits), a recommendation phase (adoption of the peer review report, often through a high-level meeting, and diffusion).

Besides the direct, and most visible, contribution of peer reviews in terms of delivering policy recommendations from a “fresh eye” and practitioner-oriented perspective, there are two other main benefits of this method in the context of S3:

1. The self-assessment phase, which often involves the search and collection of data and information that is usually not readily available in an integrated form in a region, contributes to deepen the analysis of regional SWOT and prepare the prioritization process;
2. Both the self-assessment phase and the peer visits contribute to the mobilization of stakeholders, in a way that is often less controversial than mobilization for purely internal purposes. This can fuel an evaluation process that is close to the model of “participative evaluation”, a method where the diversity of interests and perceptions of the actors taking part are explicitly taken into account (Kuhlmann 1998).

The main limitation of peer reviews relates to the difficulty of transposing results from one regional context (where the experience of the peer reviewer has been built) to another (the reviewed region). The transfer of experience is a much more complex process, involving several steps, capturing elements of contexts, institutional structure, agents, policies, etc. as depicted in Table 6. Another difficulty lies in the absence of a systematic and standardized method for assessing effectiveness of regional innovation policies

Table 6. Comparative reviews across innovation systems in OECD country reviews

Country Reviews Steps	Synthesis Steps
Assess the functional performance of innovation systems	Compare performance across countries
Determine the influence of contextual factors on functional performance	Delineate patterns of influence across several innovation systems
Survey the elements of the system structure and their performance	Compare composition and performance across countries
Determine the influence of the roles and performance of system structure elements on functional performance	Delineate patterns of influence across several innovation systems
Identify those policy interventions that positively support the contribution of structural elements to functional performance	Compare policy performance across countries
Similarly, identify policy gaps and dysfunctional policy interventions (‘failures’)	
Assess the performance of policy processes	Compare performance across countries
Survey the elements of the policy arena and their performance	Compare composition and performance across countries
Determine the influence of the roles and performance of arena structure elements on policy processes	Delineate patterns of influence across several innovation systems
Determine the influence of qualities of governance on policy processes	Delineate patterns of influence across several innovation systems
	Delineate ‘ideal types’ of innovation systems and policy arenas for different contexts
	Delineate transition pathways

Source: OECD 2009

The *Smart Specialization Platform* is also using a peer review method in the framework of the development of S3. This brings together external experts with regional and national officials to discuss particular RIS3 strategies. The process is less technocratic and less in-depth than that advocated by the OECD and so is less resource-intensive. The process has been well-received by participants. The relative merits of different approaches to peer review, including alternatives to the OECD and SSP approaches, deserve fuller consideration as part of a process of assessment tools.

Trans-regional policy learning and less advanced regions

The situation of less advanced regions needs particular scrutiny because of the “innovation paradox” reminded above. Most of the attention within the regional innovation policy field has traditionally been directed to more advanced regions, where it is thought that “good practices” in policy are found and can be transferred to less advanced regions. This raises the question: should less advanced regions and more advanced regions learn, either between themselves because they are more similar or across those categories to access more advanced practices? The latter option is more appealing for stakeholders in less advanced regions who are eager to access experience from regions which are performing better. It however raises the question whether the knowledge acquired in one type of region is transferable to the other, and under what conditions (the same question is also present, with less acuity, when regions within the same category compare to each other, since even if they share some characteristics linked to their level of development, other features of their innovation system will differ).

One particular type of less advanced regions is *regions with highly specific post-communist heritage*. With respect to the question of policy learning capacity, key general weaknesses are low professionalism and high fluctuation of staff of public sector. Moreover, the public sector is often strongly politicised, bureaucratic and - given the overall weakness of genuine strategic vision - prone to corruption. Also, regional self-government bodies have been (re) established relatively recently in these countries, resulting in lack of experience in all steps of the policy cycle.

With respect to S3 more specifically, regional authorities in these countries often lack competence in the sphere of business support and R&D, and are over-occupied with solving basic problems in spheres such as transport and environmental infrastructure construction and maintenance, management of public transport etc. This situation is typical for post-state-socialism countries. Not surprisingly, public authorities in these regions often have very limited or completely missing awareness about the real needs and challenges of RDI actors, while their knowledge of the state-of-the-art approaches to innovation support are – in the best case - partial. These deficiencies stemming from the highly specific heritage of post-communist countries apply at all steps of the S3 policy cycle:

- *Policy design*: a discreditation of the system of central planning under the command economy holds in these regions. Therefore, there is still a special sort of suspicion against any strategies or even policies as these might resemble the 5-year state plan encoded under the state-socialism. As a consequence, strategies are either considered as a kind of reincarnation of central planning or as just a formal (useless) requirement without any practical relevance. As a result, new policies and strategies are designed reluctantly and only for the most pressing issues. Consequently, instead of comprehensive and objective-oriented development policies, the strategies were (and still often are) focused on the moderation of short-term difficulties. Moreover, frequently, there existed (and still exists) a sort of institutional rupture in the sense that the departments responsible for designing the policy or strategy do not communicate well with departments responsible for implementation. Moreover, another generic weakness of strategic documents in many of less developed regions is the lack of a clearly defined strategy that would be based on a sequential and internally consistent set of interventions. This lack of strategic focus and objective-based nature leads to broad or even shallow programmes that deliberately seek to cover virtually every potential aspect rather than formulating clear priorities and measures that are both targeted and results oriented (for more see Blažek, Vozáb, 2006);
- *Policy implementation*: according to knowledge available, the following problems are the most relevant for policy implementation: the lack of formal competence and consequent reluctant allocation of financial resources for implementation of relevant strategies, lack of know-how (“devil is often in a detail”, for example, even in case of a design of a basic pro –innovation scheme such as innovation vouchers, the proper design and management of such scheme requires deep knowledge) and the lack of political support (leadership). Both the phases of policy design and of policy implementation are moreover afflicted by low trust and resulting lack of cooperation among quadruple helix actors;
- *Policy evaluation*: lack of evaluation culture is probably one of the most important deficiencies of these regions. Internal evaluation culture is rather limited. However, evaluation has relatively high standing within the principles of the EU Cohesion Policy. Unfortunately, instead of impact evaluations of effects and effectiveness of supported interventions, the evaluation studies often slipped into technical assistance for trouble-shooting of various procedural hurdles. Consequently, policy learning is practically non-existent in many of these regions.

For those types of regions, it is clear that building strong capacities for all steps in the policy cycle is a priority: in the absence of appropriate capacities, trans-national policy learning directed to S3 will not be possible.

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