Beyond EDP
Interreg Europe

European Union
European Regional
Development Fund

9 November 2017

Framework Document

Based on existing EDP Analyses and Regions´ Experiences

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CONTENTS

Appendix: List of Good Practices in the Regions
(in a separate document)

Partners in the Beyond EDP Consortium

No. of Project Partner	Partner Name, Partner State	Acronym
PP1	Centre-Val de Loire Innovation Agency, FR (lead partner)	DEV´UP Centre-Val de Loire
PP2	Universities and Higher Education Foundation of Castilla y Léon, ES	FUESCyL
PP3	Regional Development Agency Centru, RO	RDA Centru
PP4	Foundation FUNDECYT Scientific and Technological Park of Extremadura, ES	FUNDECYT-PCTEX
PP5	Lodzkie Region, Department of Entrepreneurship, PL	Lodzkie Region
PP6	, FR	
PP7	Northern Netherlands Provinces Alliance, NL	SNN
PP8	Region Östergötland, Department Regional Growth, SE	Region Östergötland
PP9	Otto von Guericke-University Magdeburg, DE	OvGU
PP10	Umbria Region, Department Programming, Innovation and Competitiveness, IT	Umbria Region
PP11	European Association of Development Agencies, BE	EURADA

1. Introduction

The Europe 2020 strategy for smart, sustainable and inclusive growth puts high premium on innovation policies. European regions are playing an important role in this respect as they are seen as providing the territorial space for innovation networks. More precisely, regions are encouraged to develop regional innovation smart specialization strategies (RIS³) to foster endogenous development. Within RIS³, "entrepreneurial discovery processes" (EDP) are key to place-based innovation by bringing together public authorities, knowledge institutes, business and civil society for creating new ideas and practices (Foray, David & Hall 2011). The 2014 reform of the EU cohesion policy has made RIS³ a strong political tool, linking the absorption of structural funds to the elaboration of regional priorities (McCann & Ortega-Argilés 2016).

The Interreg project "Beyond EDP", launched in 2016 with 11 partners from nine European countries, seeks to take stock of the experiences European regions have made with entrepreneurial discoveries.[1] In a collaborative endeavour, the consortium partners are analysing the design and implementation of EDP in different regional contexts. The final objective of the Beyond EDP project is to provide the most efficient methodologies and practices to policy makers across Europe to enable them to implement effective RIS³ for their own region. In a nutshell, the project is about good EDP management practices.

With this framework document, the project consortium is presenting its common vision on EDP management in the various phases of the policy cycle. The arguments presented here are derived from both a review of the existing theoretical literature and the experiences of the partner regions. After having analysed the concept of smart specialization in quite some detail (chapter 2), we will discuss the goals of EDP (chapter 3), its actors and processes (chapter 4), its governance structures and contextual factors as well as trans-regional dimensions (chapter 5). The conceptual elaboration will be enriched by a "view from below", which presents EDP governance structures and innovation practices in the partner regions (chapter 6). In doing so, we will be able to identify the implementation of EDP but also to point to potential shortcomings and bottlenecks in the process. The framework document is not intended to provide final results and policy recommendations. It rather serves to structure debates and to provide a stepping stone for the analysis of the reality of EDP in European regions.

[1] More information on the Beyond EDP consortium can be found at: https://www.interregeurope.eu/beyondedp.

2. Understanding Smart Specialization and RIS³

The academic ***concept of smart specialization*** has made a rapid political career within a short period of time. There can be little doubt that the Great Recession that has crashed economic expectations in many countries and regions signalled the need for new policy ideas. The original concept was developed by a group of academic advisers to the European Commission, the "Knowledge for Growth Expert Group" (K4G), who bemoaned the productivity gap between the USA and Europe. This gap was seen as resulting from the national fragmentation of innovation efforts and constituting a barrier to growth in the European Union (Foray & van Ark 2007; Barca 2009; Foray et al. 2011). The expert group recommended to "encourage investment in programs that will complement the country´s other productive assets to create future domestic capability and interregional comparative advantage" (Foray, David & Hall 2009: 1).

Only a few years later, the EU adopted the concept of smart specialization as key to its Europe 2020 innovation strategy for promoting economic competitiveness and high levels of employment. Underpinned by seven flagship initiatives, economic production should become more closely linked to knowledge-based research and development (*smart growth*), industrial production more strongly oriented towards a resource efficient and low carbon economy (*sustainable growth*) and political and social efforts strengthened to deal with the problems of unemployment, poverty and exclusion (*inclusive growth*). The member states of the EU agreed upon developing national reform programmes in implementing the Europe 2020 strategy, highlighting the role of regions and regional stakeholders in the process (Detterbeck 2014).

As a pre-condition for funding innovation-oriented projects, the smart specialization approach became firmly entrenched in the reformed EU cohesion policy for the 2014-2020 period. Regions were legally obliged to devise and implement RIS³ as an ex ante-conditionality for structural fund attribution in some of the operational programmes (McCann & Ortega-Argilés 2015). With the stronger inclusion of local expertise in innovation strategies, the EU hoped to make cohesion policy more effective and to give additional legitimacy to the European Structural and Investment Funds (ESIF). From the outset, the European Commission has promoted the bottom-up logic of RIS³ (Kroll 2015).

How can we understand the concept? Smart specialization has been defined as a ***strategic approach to economic development focusing on targeted support for research and innovation*** (Boschma 2016). As a policy concept, smart specialization emphasizes the principle of prioritisation and defines entrepreneurial discovery processes as the method to identify such desirable areas for innovation policy interventions (Foray & Goenaga 2013). While originally intended to guide stakeholders in a specific economic sector or domain in their search for future opportunities, the political adoption of the concept soon turned to stakeholders in a regional context. Hence, smart specialization (S²) turned into smart specialization strategies for regional innovation (RIS³).

By making targeted choices on where to concentrate public resources in knowledge investment, regions should facilitate the growth of endogenous economic strengths in existing or new areas. Rather than doing a little bit of everything, regions will have to find out about their economic assets, their knowledge base and the potentials for competitive advantages (OECD 2013; McCann & Ortega-Argilés 2015). Hence, RIS³ are characterized by the presentation of a diversified portfolio of related activities (Del Castillo, Paton & Barroeta 2015).

Although there is no elaborate theory of smart specialization, it draws on a ***number of theoretical approaches***. It is rooted in the classical economic theories of economic growth, division of labour and trade specialization. More recent strands of economic thought from evolutionary economics to the economics of agglomeration have also been influential, most notably in the ideas of critical mass, increasing returns and knowledge spill-overs. Debates on industrial development, economic clusters, neoclassical spatial economics and new industrial policies have been other important sources for the concept of smart specialization (Foray & Goenaga 2013: 4-5; OECD 2013: 18).

With regard to RIS³, theories of new regionalism suggest that economic globalization and political internationalization have led to a rescaling of political authority in which both supranational and regional levels have gained weight. Regions, situated between the national and the local level, face new forms of competition for economic growth but are also able to engage in new forms of trans-regional cooperation. In an increasing number of EU states, regions hold political and/or administrative competences in policy areas such as education, research and development or labour market regulation, which are of vital importance for innovation strategies. Hence, the mobilization of regional assets and the definition of strategic priorities is key to success in open markets (Keating 1998; OECD 2011).

A second motive for a regional focus in smart specialization, and in innovation strategies more broadly, has to do with “innovation paradox” (Oughton, Landabaso & Morgan 2002). As experiences within and beyond Europe show, economically weaker regions which would be most in need to lift up their research, development, technology and innovation potential are those that pay less attention to innovation activities as a factor for regional growth. Weaknesses arise from a mixture of shortcomings in economic potential, institutional capacities and governance capabilities (McCann & Ortega-Argilés 2016). There are substantial innovation divides between regions in terms of R & D outputs. With respect to EU cohesion policy, lagging regions are also less capable of absorbing policy funds in beneficial ways (Seravalli 2009). For weaker regions, smart specialisation thus constitutes a specific opportunity but also a vital challenge. The trick is to entrust local stakeholders with the definition of strategic priorities and the building of innovation networks in circumstances, which are far from perfect.

As a ***new paradigmatic approach to innovation policies***, smart specialization moves away from the old dogma of neutrality. Rather than spreading public investment thinly across research areas and technologies, the new approach suggests to select preferred areas for policy intervention. Smart

specialization urges policy makers to set priorities in certain domains "in order to realize the potential for scale, scope and spillovers in knowledge production and use, as these are important drivers of productivity in the domain of R & D and other innovation-related activities" (Foray, David & Hall 2011: 4). Smart specialization is about finding the right niches for innovation policies.

Advocates of the approach stress that smart specialization has to offer something for all types of regions. While technology leaders may be strong enough to compete in key technologies, such as ICT or biotechnology, innovation followers may concentrate their efforts in applying these technologies to important sectors of their economy in the mode of co-invention. The choice of priorities is thus not restricted to high-tech industries, as new domains are also to be found in traditional industries, manufacturing or services. In improving the operational efficiency and product quality in a given business area, regions will have to generate their own knowledge-driven activities. Hence, there is more than one show in town (Foray et al. 2011: 5).[2]

However, going special will only work if general framework conditions (like competition policy, labour markets, trade policy) are favourable to economic development and if general public investments in education, research infrastructure and training provide sufficient man-power, skills and human capital. Smart specialization therefore asks for an integrated strategy in which "winning activities" are picked and supported intensively, but in which the broader social and economic basis remains intact (OECD 2013: 12). In a similar vein, smart specialization is about fostering R & D in highly innovative environments but it also about encouraging the transfer of new technologies and knowledge from the more innovative to the more traditional business sectors.[3]

In this sense, regional context matters. Innovative activities as motor of economic growth will only work if they are suited to the economic structures and knowledge facilities at place. In fostering cooperation within such a regional ecosystem, new opportunities can be detected or old opportunities developed further. While the idea is not to "specialize" whole regional economies on specific sectors, smart specialization encourages regional actors to concentrate their efforts on specific activities at the interfaces of science, technology and business. Smart specialization sits in between supporting individual projects (which would be too narrow) and promoting an entire economic sector (which would be too broad). Potential for economic growth results from a collection of related activities that foster innovation capacities in a region (Foray 2014).

Building a regional innovation profile will have to centre on embedded dominant fields in the region which have the relevant scale and magnitude but connect these fields with other economic activities by diversifying new ideas and practices within and across sectors (Kroll 2015). Smart specialization

[2] For an intense debate on the potential of peripheral or lagging regions to engage in smart specialization, see McCann & Ortega-Argilés 2015; European Commission 2017.

[3] Examples include the use of bio-medical innovations for industries in the Basque Country, the potential of nano-technologies for production in Finland, and the organization of sub-contracting networks in the British Midlands. In all of these cases, smart specialization consisted of diversifying successful practices across economic activities (see Foray & Goenaga 2013: 4).

strategies can thus be understood as attempts in discovering "specialised diversifications across related technologies which are important for growth" (McCann & Ortega-Argilés 2015: 1298). Concentrating resources and focusing efforts around the region´s core competences generates size and critical mass effects (Foray & Goenaga 2013).

Smart specialization will therefore be associated with ***structural change*** in the economy. There can be different paths here, from the transition and modernization of already existing economic activities, over synergies between older and newer areas, to the more radical transformation of economic structures with entirely new and distinct domains of enterprise (Foray et al. 2011: 8-9). Whatever the structural changes are, smart specialization strategies can potentially run into a number of severe problems. Discovering the right domains of specialization is a difficult task that suffers from a series of potential coordination failures. The literature distinguishes between three such pathologies (Foray et al. 2009; Foray et al. 2011):

(a) Top-down centralized planning: political and administrative elites seek to identify priorities for economic development by taking recourse to some form of planning future developments without taking into account the scientific and economic knowledge "on the ground";
(b) Interest group capturing: dominant interest groups and well-established players take control of the new instruments of strategic action, serving their own preferences while pushing competing and innovative actors out of the game;
(c) Imperfect appropriation: innovative actors who are capable of exploring new activities do either not have incentives to share their individual knowledge with other participants whom they might see as potential competitors or do not have the resources and networks to expand on their ideas.

Realizing these problems, which may lead to picking the wrong priorities, the concept of smart specialization envisages a broad and quite complex policy process to be set in place. Defining the right domains of future specialization, integrating all relevant interests represented in the region, and helping new activities to become solid drivers of economic growth needs a careful design of the appropriate role for political decision-makers, management agencies, regional stakeholders and entrepreneurs as well as civil society. This is why "entrepreneurial discovery processes" (EDP) are at the heart of smart specialization. EDP are crucial for collecting and aggregating dispersed knowledge, bringing together a wide array of actors to arrive at a shared vision of regional development and thus providing legitimacy to a policy process which aims at economic structural change. In conducting EDP, evidence-based instruments are key to avoid the potential pathologies of RIS³ by proving that there is growth potential in the areas chosen for innovation activities. Policy makers do not have innate wisdom about future priorities. They need to be prepared to listen to entrepreneurs, researchers and citizens in order to identify specialization areas, improve their acceptance and facilitate the emergence and growth of new activities.

3. The Objectives of EDP

Entrepreneurial discoveries are among the main defining features of smart specialization strategies. In many ways, the quality of RIS³ depends on an efficient understanding and implementation of EDP. As a bottom-up process, EDP implies a clear break from centralized planning in innovation policies. Governments and public administrations still play an important moderating role in EDP (see below), but they engage more thoroughly with regional stakeholders. The guiding idea is that for the identification of knowledge-intensive areas for potential growth, a "self-discovery process" has to be set in place (Hausman & Rodrik 2003). Only then, all the available information on given resources and assets, market potentials and weaknesses will be collected and aggregated for informing the choice of priorities in research and innovation. The political logic of EDP is that of an inclusive and interactive learning process in regional development with participants from different backgrounds, which commonly constitute the so-called "Quadruple Helix" (Q4 Helix) of policy-makers, business, academia, civil society. Seen from a governance perspective, EDP thus constitutes a modern form of collaborative decision-making in innovation policies (Foray & Goenaga 2013; Martinez & Palazuelos-Martinez 2014; Del Castillo et al. 2015).

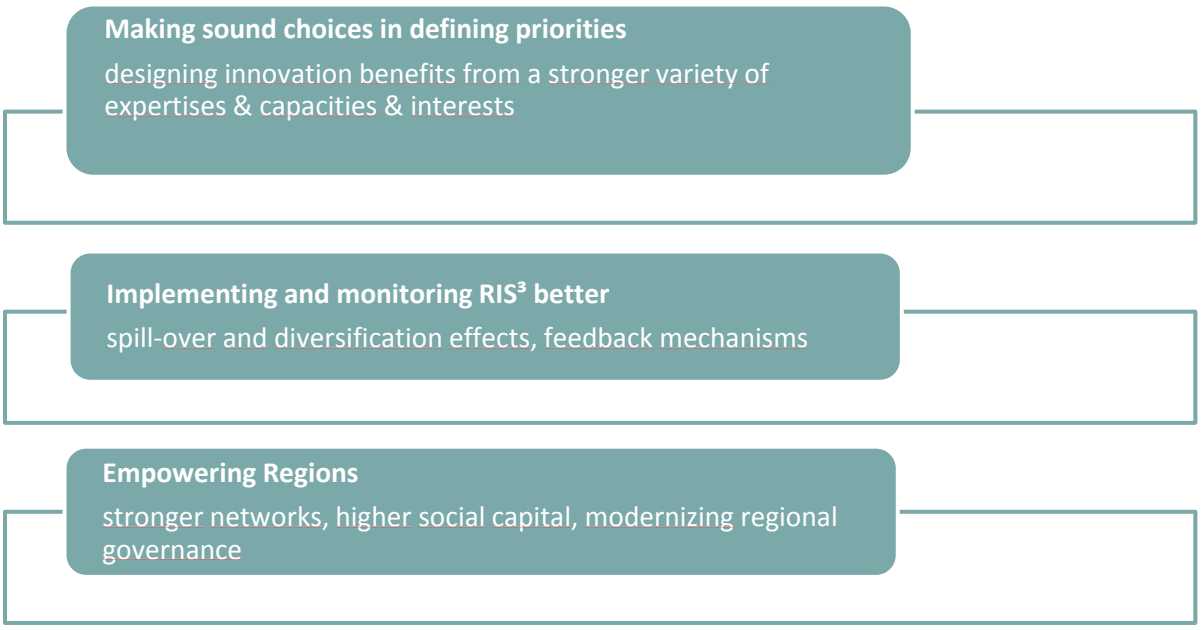
What is EDP trying to achieve? We can identify three distinct yet related objectives in regional self-discoveries. First, it involves a much broader range of perspectives in ***defining priorities*** of public investment. Political decisions on where to specialize in innovation will be informed by more input from more diverse sources. A rigorous self-assessment of the region´s knowledge assets, capabilities and competences will benefit from the variety of participants in the process. Knowledge about science, technology and engineering will be as valuable as knowledge of economic markets and value chains in production and services (Foray & Goenaga 2013: 5). Bringing in civil society will further enhance the legitimacy of innovation policies by including the interests of relevant social groups in the region. This may be particularly relevant in tackling broad societal challenges, such as demographic change. Hence, EDP helps in the design phase of RIS³ for making better choices in defining priorities. EDP provides for a more comprehensive knowledge base at the disposal of policy-makers and it allows for societal engagement that contributes to the local ownership of the process and the specialization strategy more generally (Rodríguez-Pose & Wilkie 2015: 7).

Second, EDP can help to ***implement and monitor RIS³ better***. Discoveries about new opportunities for the regional economy will have to be made real by learning how these priorities can be activated in the region. Among the important processes here are spill-overs and diversification effects by which actors follow the initial experiment and contribute to the new activity by applying them to their field (Foray & Goenaga 2013: 6). EDP can facilitate such exchange and cooperation by bringing together regional stakeholders. The process thus supports related activities with their potential for scale and agglomeration dynamics (McCann & Ortega-Argilés 2015). There are also important feedback mechanisms by which the experiences garnered in EDP formats – such as workshops, focus groups, platforms, surveys or community meetings - provide new information for an updated definition of

priorities. Qualitative and quantitative data can be used as indicators in monitoring outcomes. Priorities may therefore change over time and some activities may cease to be part of an RIS³ agenda after some years (Rodrik 2004; Foray & Goenaga 2015).

Third, EDP can contribute to ***regional empowerment*** (Rodríguez-Pose & Wilkie 2015: 8-9). Establishing permanent interaction between a wide range of actors will contribute to stronger networking activities in the region. It also helps to narrowing the gap between the spheres of politics, academia, business and society. Actors will get to know the perspectives and ideas of other stakeholders. This will facilitate exchange and cooperation. Personal contact may promote social trust, reduce transaction costs and moral hazards and ultimately foster the emergence of a "micro-economic environment that comes across to individual actors as a reason to have confidence in the economic process" (Rodríguez-Pose & Storper 2006: 6). As has been noted above, EDP may also serve to modernize governance structures and to make regions "fit" for cooperation in the European system of multi-level governance. An important factor for assessment in EDP therefore is whether local and regional political institutions facilitate or mitigate specialization in innovation policies.

Figure 1: The Objectives of EDP



Source: Own illustration.

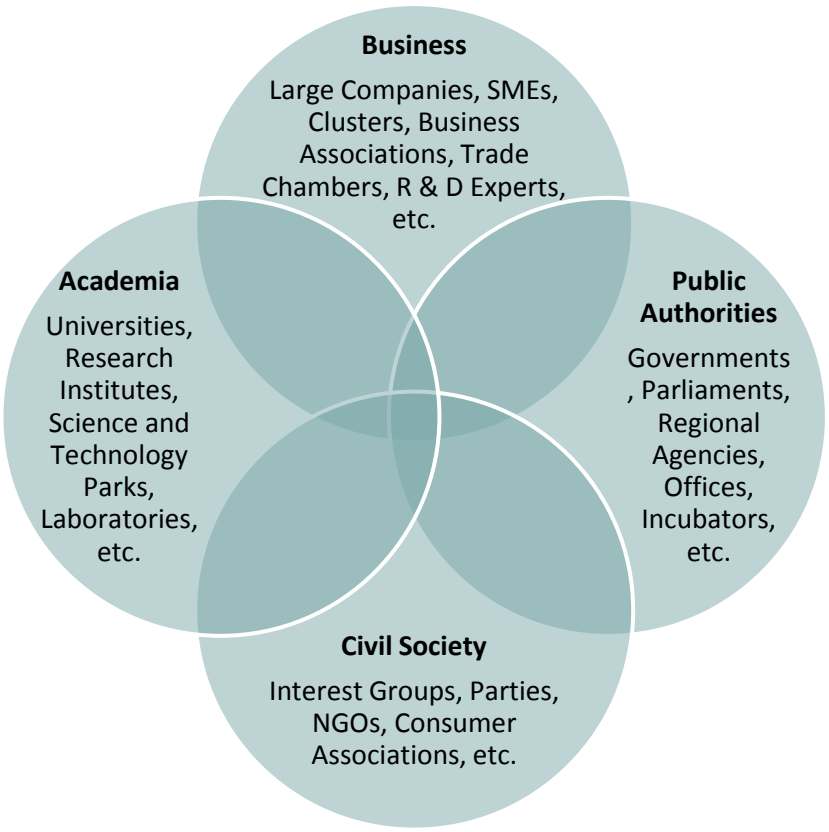
4. Actors and Processes in EDP

4.1. The Quadruple Helix: Who are the Actors in EDP?

EDP constitutes a learning process by which regions gradually discover their priorities and find out, through experimentation, how these priorities can successfully be transformed in economic and social activities (Del Castillo et al., 9). While the idea of specialization is quite simple, its practice is not. Choices are risky, the necessary public-private partnerships are difficult to establish and maintain, regional cooperation may suffer from a series of shortcomings. Therefore, getting the processes right is key to the success of EDP.

There is a general consensus in the literature on the notion of an inclusive and interactive bottom-up process which is evidence-based and gathers the expertise of a wide array of regional stakeholders to new insights into regional development. The involvement of many actors in consultation processes and collaborative action is the hallmark of EDP. Inclusiveness is most often associated with the idea of the Q4-Helix involving policy-makers, business people, researchers and representatives of civil society. The point here is that each of these types of actors can make a substantive and distinctive contribution to EDP (see Rodríguez-Pose & Wilkie 2015). Who should be part of EDP?

Figure 2: The Quadruple Helix (Q4 Helix)



Source: Own illustration, based on Pinna 2015.

In some respects, ***entrepreneurial agents*** are at the heart of the process. This include firms and companies, R & D experts as well as higher education and research institutions. It is their scientific, technological and economic knowledge, which is crucial to discover the right domains of specialization. Hence, they should be driving the process of setting priorities. In making use of their facilities and resources, entrepreneurs in a broad sense are to scan the available economic and market opportunities, foster academic and research collaborations, identify technological and market niches for exploitation and thereby act as the catalysts for driving the emerging transformation of the economy (Foray et al. 2011: 7; McCann & Ortega-Argilés 2015: 3).

However, there are several challenges related to the involvement of entrepreneurial agents in EDP (see Martinez & Palazuelos-Martinez 2014). First, stakeholders from business and academia will have to find incentives to engage in collaborative activities and to keep their participation alive throughout the policy cycle. EDP may suffer from an inadequate supply of entrepreneurial knowledge if potential stakeholders do stay away (or drift away) from the process. Second, EDP has to deal with the "usual suspects" phenomenon, in which only actors that have always been around and are closer to the regional authorities are taking part. New voices and interests have to be included in the process in order to take advantage of all relevant contributions to regional development. Third, there is need to differentiate between actors from these fields according to their specific needs, preferences and capacities, while at the same time keeping an eye on holding these different actors together in the management of the ecosystem.

Looking at the economy, for example, large companies and SMEs will have different perspectives and resources but may still come to share a common vision of regional development if all of their respective interests are accommodated. In that sense, the success of EDP very much depends on fostering the commitment of potential stakeholders. This is true for large companies and foreign investors who can bring in valuable resources, like R & D facilities. They may act globally, but they may, at the same time, also think locally. One of the aspects that matter here is the education and training of a qualified workforce in the region. For SMEs, which often do not have the time or the resources to be involved in a scheme of participatory governance in public policies, intermediary organizations, such as regional chambers of commerce and industries or economic and social councils, may be helpful in bringing in the perspectives and needs of smaller enterprises. Policy instruments, such as innovation vouchers to SMEs, which grant them access to technological parks and laboratories for specific projects, can also foster the participation of smaller companies in innovative activities.

There is also a very central role of ***governments, parliaments and public administrations*** (Iacobucci 2014; Rodríguez-Pose & Wilkie 2015). They have to encourage entrepreneurs to become involved in EDP, avoid selection biases and interest group capturing, and take political responsibility for RIS³. They are also important for aggregating entrepreneurial knowledge as well as for evaluating and assessing the effectiveness of specialization. Generally speaking, political and administrative actors have a

moderating role to allow for an open and inclusive process.[4] As a closer look on EDP governance structures will show, distinguishing between the level of political decision-making, the level of political management and the level of technical management allows for a clearer understanding of the various roles, logics and competences of political and administrative stakeholders (see below).

The main challenge is to find an appropriate role of government and parliament in EDP. There is a fine line between steering the process and listening to an inclusive and interactive process when reaching decisions. Policy-makers have the power to make decisions on public spending, with regard to both general framework conditions and priority domains. It is thus simply a matter of recognizing the game of political power to acknowledge that regional governments and parliaments should not be passive spectators to EDP. The more political actors are involved, the more it is likely that they will stick to entrepreneurial discoveries when making their decisions. On the other hand, having too much of a steering role for politicians and EDP managers risks the bottom-up character of EDP. Finding the right balance is one of the tricky elements of EDP governance (see Foray, David & Hall 2011; Kroll 2015).

Another delicate question concerns the right level of inclusiveness. EDP lives from the idea that bottom-up discoveries are necessary for finding priorities in innovation policies. Yet, there can be tensions between broad participation and the need to find compromise in an effective and efficient way. It seems important, therefore, to establish decision rules in EDP that help to come to an agreement in cases of confrontation and to balance democratic aspirations with expert-driven processes.

The final set of actors are ***members of society*** in general. They will not only provide additional knowledge and perspectives in EDP, they will also generate democratic legitimacy. As we are talking about future political decisions, it is of vital importance that citizens can have a say. Participatory mechanisms such as EDP are a means to answering the crisis of representative democracy which is visible in the advance of populist forces and the mistrust in political institutions. Allowing for the empowerment of citizens therefore serves important aims.

There are different ways of ensuring public participation on an individual (e.g., citizen committees) or a group basis (e.g., hearings including civil society organizations). Both will provide for a broader input of interests beyond business and academia. Civil society engagement is particularly important for realizing aspects of social inclusion and sustainable growth, as envisaged in the Europe 2020 strategy. Moreover, bringing in citizens in some form of public dialogue contributes to the embeddedness of

[4] Especially in lagging regions where there is often a negative combination of barriers to innovation (innovation divide), there seems to be need for well-advised governance by encouraging maximum engagement of all stakeholders in regional development – if there are only few buttons to be pressed, all that are available should be pressed (McCann & Ortega-Argilés 2015: 14). However, it seems questionable whether lagging regions are (always) lucky enough to have strong and stable political leadership for such an active steering role of policy-makers open to all relevant interests in society.

smart specialization by making regional political communities responsible for governing EDP. Social engagement enhances the place-based and bottom-up nature of RIS³ by strengthening the local ownership of the process (Rodríguez-Pose & Wilkie 2015). What do people living in this place at this time aspire to?

While there are good arguments for extending democratic participation, the key challenge is to include citizens in debates on regional development. The perceived lack of public interest and the complexities of expert discussions on issues like innovation policies and comparative economic advantages are important in this respect. It seems important, therefore, that citizens find their interest and needs included in the traditional channels of representation (parties, parliament, interest groups and civil society groups). Moreover, citizens can become involved in EDP practices in the realization of local initiatives. Finally, there is potential for mobilizing citizens around policy instruments such as participatory budgets, which may form part of EDP action plans.

4.2. The EDP Policy Process

Recent accounts have stressed the cyclical nature of EDP (see Perianez-Forte, Marinelli & Foray 2016). Rather than simply bringing stakeholders together for the identification of investment priorities as a one-off event, it is the whole policy process from agenda setting to policy formulation, decision making and implementation as well as to subsequent assessment and evaluation of chosen policy practices that should be informed by an wide array of inclusive public-private consultations. The role of individual actors throughout the entire process may well vary across the different stages of EDP. Yet, it seems vital for success to maintain dialogue and involvement of all stakeholders over the whole process. Designing EDP governance structures thus has to ensure continuity of interaction but also flexibility in working together.

The idea of a public policy cycle driven by EDP also conveys the message that different policy instruments have to be combined (OECD 2013; Foray 2014; McCann/Argiles 2016: 284). In the agenda-setting phase, evidence-based practices – ranging from SWOT analysis of regional capacities, studies on scientific, technological and economic trends, to the mutual assessment of stakeholder competences and potentials – are vital for a rich data set informing discussions on priorities. In the policy formulation and decision making phases, broad participation of stakeholders in focus groups, committees and public platforms ensures the bottom-up quality of RIS³ in identifying a region´s core competences. In the implementation phase, the involvement of stakeholders in the management of project calls is crucial for the realization of priorities. And finally, the monitoring and evaluation phases need interactive and inclusive mechanisms for a “continuous reflection on market opportunities, as well as a periodic re-assessment of the investment priorities previously identified” (Perianez-Forte, Marinelli & Foray 2016, 20).

Figure 3: EDP Policy Cycle

Source: Perianez-Forte, Marinelli & Foray 2016: 21.

5. EDP Governance Structures

5.1. EDP Governance: Level of Regional Authority

The concept of smart specialization in which EDP plays an essential role builds from the idea of endogenous growth in which the specific strengths and weaknesses, opportunities and threats of a region are the starting point of social and economic development. As a ***place-based approach***, there is little doubt that the design of EDP has to be adapted to regional circumstances. There is no "one size fits all" (Foray et al. 2011).

While the goals, actors and processes of EDP will be broadly similar across regions, the way in which stakeholders´ interaction in defining and realizing innovation potential will work differs between them. One of the most important factors to be considered is the institutional setting of regions (Rodríguez-Pose & Wilkie 2015). How capable are regions of realizing the ambitious processes of RIS³ and EDP? From an institutionalist perspective, there are two broad answers to this question. One the one hand, regional capacities have to do with the general level of regional authority, i.e. the relative strength of regions within a given political systems. On the other hand, regional capacities depend on the precise ways in which smart specialization is governed, i.e. the institutionalization of EDP processes. Let us look at these two elements of EDP governance in some more detail.

Regions with high levels of legislative and/or administrative competences in innovation policies will have leeway to engage and empower stakeholders in the decision-making process. They are able to control, and finance, policy areas of vital importance for implementing specialization strategies. They are also able to change policy instruments and policy mixes as they see fit. The level of ***regional authority*** can be measured:

(a) in terms of the autonomy in policy scopes, powers over taxation and borrowing, and elected representative assemblies and executives (which is the self-rule component);
(b) in terms of access to decision-making at the central political level via second chambers, intergovernmental bodies and constitutional conventions (which is the shared-rule component).

Regions in federal and decentralized states score higher on the regional authority index than regions in unitary states (Hooghe et al. 2016). Regions with lower levels of authority are arguably more strongly dependent on new configurations between the EU, the central state and the sub-state levels to engage in EDP (Perianez-Forte, Marinelli & Foray 2016, 30).

However, institutional powers are only part of the story. Regional engagement with EU policies also depends on the quality of political leadership, the adaptation of public administrations to Europe and the level of cooperation in regional civil societies (see Jeffery 2000). Regions vary to the extent to which public-private partnerships, citizens´ engagement and cooperative structures are part of the traditions and practices of policy-making. This raises questions of political participation, social capital and mutual trust in the region that facilitate coordination and cooperation for mutual benefit (Putnam 1994). Technological potentials, the quality of the academic and scientific infrastructure and the overall economic capacities of a region also have strong impact on place-based strategies of development. Hence, while there is no universal best solution, the success of EDP strongly depends on a good match between the institutional environment and the choice of EDP governance structures (Rodríguez-Pose & Wilkie 2015).

As the term ”governance” implies, EDP is characterized by collaborative leadership arrangements. Governments share power with a variety of actors and networks in realizing innovation policies. While some tasks, like taking final decisions on public funding, have finally to be exercised by the political level, many aspects of setting priorities and implementing RIS³ can benefit from exchanges between stakeholders in the Q4-Helix. The ways in which EDP can successfully be established and implemented depend on the regional context. Governance structures have to be attuned to and appropriate for regional needs and capacities.

Arguably, however, general principles of good governance apply to all regions. Among them, we find a sound and flexible combination of top-down leadership and bottom-up participation in innovation

policies, mechanisms for transparent decision-making and project financing, and a vertical focus on specific priorities (Edwards, Pertoldi & Morgan 2016).[5]

5.2. EDP governance: Level of Institutionalization

The second element of EDP governance is the ***level of institutionalization***. As mentioned above, when discussing the role of governments and public administrations, steering RIS³ processes is a key issue. This applies to the design phase of selecting priorities, but maybe even more so to the implementation of specialization strategies. Who is getting things started, and who is responsible for keeping stakeholder involvement, and EDP processes more generally, going? Institutionalist approaches assume that institutions constrain and regularize social behaviour (March & Olsen 1989; North 1990). Human interactions will become reliable as there are good reasons to expect that most people most of the time respect and follow formal and informal structures, rules and values. As structures are important for processes and outcomes, changing the institutional format will lead to different exchanges between actors and different results.

Institutions shape human action due to their regulative powers, their normative obligations and their cognitive schemes. Regulative powers of institutions give rise to a logic of instrumentality as actors follow rules and laws, normative obligations employ a logic of appropriateness as actors fell obliged to meet perceived social expectations, cognitive schemes work on a logic of orthodoxy as actors´ thinking is shaped by constitutive schemes they are taking for granted. In sum, these three pillars of institutions explain how institutions shape human behaviour (Scott 2014). The more coherent and cohesive such institutional structures are, the higher the level of institutionalization.

In setting up a stable institutional framework for EDP, therefore, the continuity of stakeholder interaction can be strengthened. If institutionalist assumptions are correct, participation will become part of the habitual practices of actors while at the same time a new cognitive mind-set can take hold in which exchange, cooperation and mutual trust plays a dominant role. The idea of a shared vision of regional development and a common agenda of targeted choice may be seen as the "*Leitmotiv*", or central theme of this cognitive dimension of EDP institutionalization (see Edwards, Pertoldi & Morgan 2016). Institutionalization also refers to the establishment of regulating bodies that coordinate action. The working of management bodies, steering committees, advisory boards and other institutions are thus of vital importance for the reality of EDP in European regions. Their quality and effectiveness in steering EDP are arguably strongly correlated with questions of membership composition, resources, lines of responsibility and decision-making competences. However, as already mentioned, there is also

[5] Edwards, Pertoldi & Morgan (2016) list seven such principles of good governance: (a) balance of leadership and participation, (b) a collective vision on regional development, (c) trust and transparency, (d) holistic approach to implementation and a vertical focus on specific priorities, (e) feedback mechanisms in regional policy-making, (f) multi-level governance and inter-regional cooperation, and (g) reflection and learning.

a balance to be drawn between hierarchical top-down control and inclusive bottom-up openness (see above).

Figure 4: Institutionalization of EDP Governance

Regulative Aspects	Normative Aspects	Cognitive Aspects
• Steering and Managing RIS³ Processes • Coordinating Stakeholder Interaction	• Social Expectations on Actors´ Behaviour • Habitual Participation in Stakeholder Meetings	• (New) Mind-set of Cooperation and Trust • Shared Vision of Regional Development

Source: Own illustration, based on Scott 2014: 60.

5.3. EDP Governance: Trans-regional Cooperation

Finally, there is also an important ***trans-regional dimension*** to EDP. As policy concepts for innovation, the Europe 2020 strategy in general and the smart specialization strategy in particular have strengthened structures of multi-level governance in which European institutions, member states, regions and local stakeholders cooperate for achieving shared goals (see Detterbeck 2014). At the same time, trans-regional bonds have become an important tool for pooling resources and learning from other experiences in the EDP management. Horizontal collaboration between regions has aimed to ensure an optimal and effective uptake of EU structural funds, but also to identify innovation potentials in sharing expertise and capacities. EU funds may thus be an important facilitator of strengthening the trans-regional dimension (Perianez-Forte, Marinelli & Foray 2016). More generally speaking, regions in Europe have been found to cooperate on the basis of sharing similar priorities, but also on the basis of finding complementary interests in specific activities and economic sectors (Keating 1998; OECD 2011).

6. The "View from Below": EDP in the Partner Regions – the Methodologies used [6]

6.1. EDP Processes in the RIS³ Design

Broad participation of Q4-Helix stakeholders is the hallmark of EDP. For most of our partner regions, there has been a longer tradition of elaborating innovation policies within the regional ecosystem, bringing together experts from the spheres of science, technology and business with political and administrative bodies responsible for delivering regional planning. Among the methods used, the establishment of advisory councils (reporting to regional government departments), working group meetings, surveys and interviews were quite common. For this reason, there has been a quite natural evolution from these practices and experiences to the methodologies of smart specialization.

For the ***design phase of RIS³***, profound analyses of regional economic profiles, technological capacities and strategic comparative advantages but also of scientific potentials and societal challenges, in the region and beyond, were carried out in a first step, following the methodology proposed by the European Commission´s Smart Specialisation Platform (European Commission 2012). In some places, this was done with the help of external experts, in other places, regional government agencies conducted the innovation analyses.[7] Whatever the approach was, the task has been to decipher the "regional DNA", as the RIS³ report in the Northern Netherlands nicely put it (SNN 2013: 7).

In a second step, a Q4-Helix participatory process for RIS³ elaboration was established. Here we can find a subtle yet interesting difference between the partner regions, concerning the coordinating role of regional governments and its innovation agencies. In a majority of cases, the EDP process was kept quite close to the political level and dynamics were steered by the body or department responsible for the RIS³. In some cases, however, the political level was kept away from the 'driver seat'. By purpose, some distance from politics was sought in order to allow for a more inclusive deliberation and decision-making process on which path to follow in setting priorities for research and innovation. Hence, this seems to suggest that there still is room for

[6] The data on RIS³ and EDP in the partner regions has been collected via an internal survey within the consortium, conducted in October and November 2016, peer-review events in some of the regions (Northern Netherlands, Castilla y Léon, Östergotland, Lodzkie Region, Centru) and publicly available material on the RIS³ of the regions. We would like to thank the S3 Platform at the Joint Research Centre (JRC) for giving us access to their survey data on EDP with regard to the regions in our consortium.

[7] As an example of the first approach, the *Land* government of Saxony-Anhalt (Germany) commissioned two external scientific consultancy firms for conducting such a SWOT analysis (VDI & GIB 2013; Ministry of Sciences and Economic Affairs of the Federal State of Sachsen-Anhalt 2015). Castilla y Léon (Spain) represents the second approach. Here the Science and Technology Coordination Commission, a regional government agency, analyzed the regional innovative potential (Junta de Castilla y Léon 2014). In this second approach, we also find national research agencies being involved in the mapping of regional economic and technological specializations, as in the case of Umbria.

controversy around the issue of the political management of economic development in European regions.

In the Northern Netherlands, for example, there was only a limited steering role for the political level in the RIS³ design phase. A Q4-Helix "strategy council", later succeeded by a Task Force RIS³, took responsibility for the process. The task force was accountable to the regional board of government. The daily work was done by a project team, which was Q4-Helix organized as well. Under this umbrella, several working groups were installed – all of them Q4-Helix. Each working group consisted of about 10-15 people. A broader involvement of stakeholders was achieved through several so-called regional "power sessions". Over 150 stakeholders participated in these workshops, which were organized around specific themes. In addition, several consultation rounds were held – among which a broad one via the internet.

In general, however, the processes around the next steps of smart specialization looked rather similar across the cases.[8] Regions followed a focus group methodology. It consisted of open surveys, political meetings, working group meetings and round-table talks. The designed strategy was presented to the broader public in innovation conferences. Quite often, stakeholder engagement started out in smaller circles for getting activities started and for creating an atmosphere of trust and cooperation. In lowering the constraints of publicity, an easier exchange of opinions was facilitated. Over time, the body of stakeholders active in the process enlarged. As a main weapon to fight the "usual suspects" syndrome, openness to new entrants and evidence-based mechanisms to test arguments on comparative advantages and critical mass were employed by the regions.

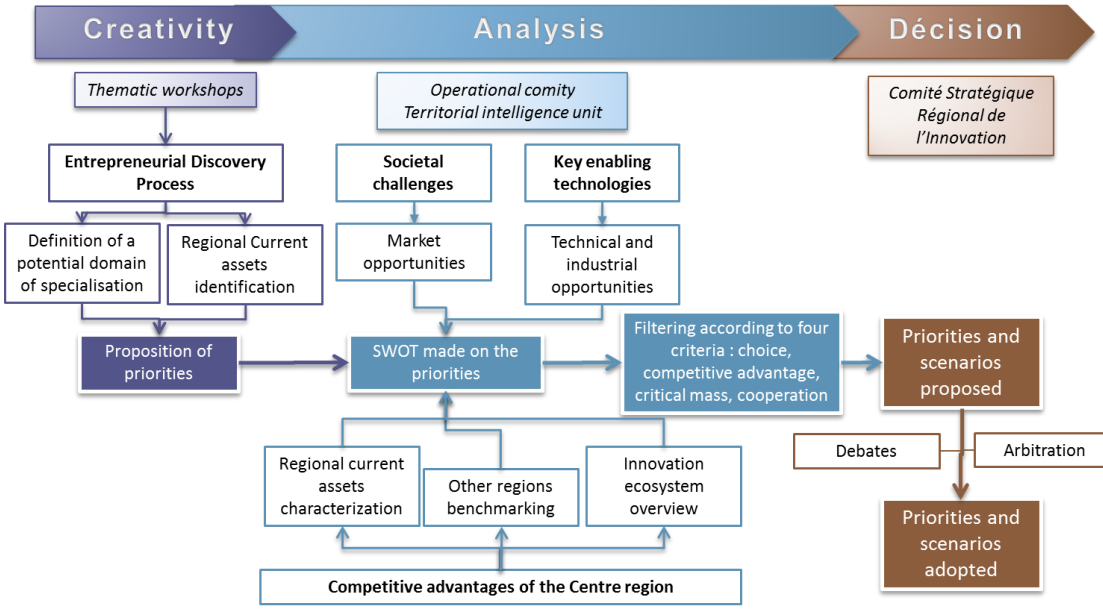
As an example, the following graph depicts the EDP process in the design phase of RIS³ in Centre-Val de Loire in France (see Fig. 5). Three thematic working groups, each composed of some 20 to 30 entrepreneurial agents from the Q4-Helix, investigated the potential areas of specialization. The regional innovation agency (ARITT Centre) managed the creativity debates in these workshops and conducted the analysis of the priority domains *in spe*, following the fact-based criteria of targeted choice, competitive advantage, critical mass and cooperation (the so-called "4 C" criteria). At a broad regional innovation conference, a larger consultation and information process could take place, involving many more stakeholders in the RIS³ design phase.

In the potential priority area, representatives from the economic and the academic sectors were chosen as "pilots and co-pilots". As renowned experts in their respective fields, their role was to link the different actors in the Q4-Helix and to channel information from one sector to another sector. Among their task was also the support of projects and scenarios for growth, which were

[8] According to the European Commission´s methodology, these steps included the development of a shared vision of regional development among the stakeholders (third step), the identification of horizontal objectives and thematic priorities for the region (fourth step) and the definition of an action plan with a coherent policy mix (step 5). See European Commission 2012.

then put to a broader concertation process within the stakeholders´ groups. There also was opportunity for online interaction via the ARITT Centre website. In a final step, with all proposals being worked out, decisions were taken by the regional innovation steering committee, which adopted thematic priorities and scenarios for innovation. This body is led by representatives of the regional government (the president of the regional council and the prefect, who is seconded from the national level) but brings together Q4-Helix stakeholders more generally.

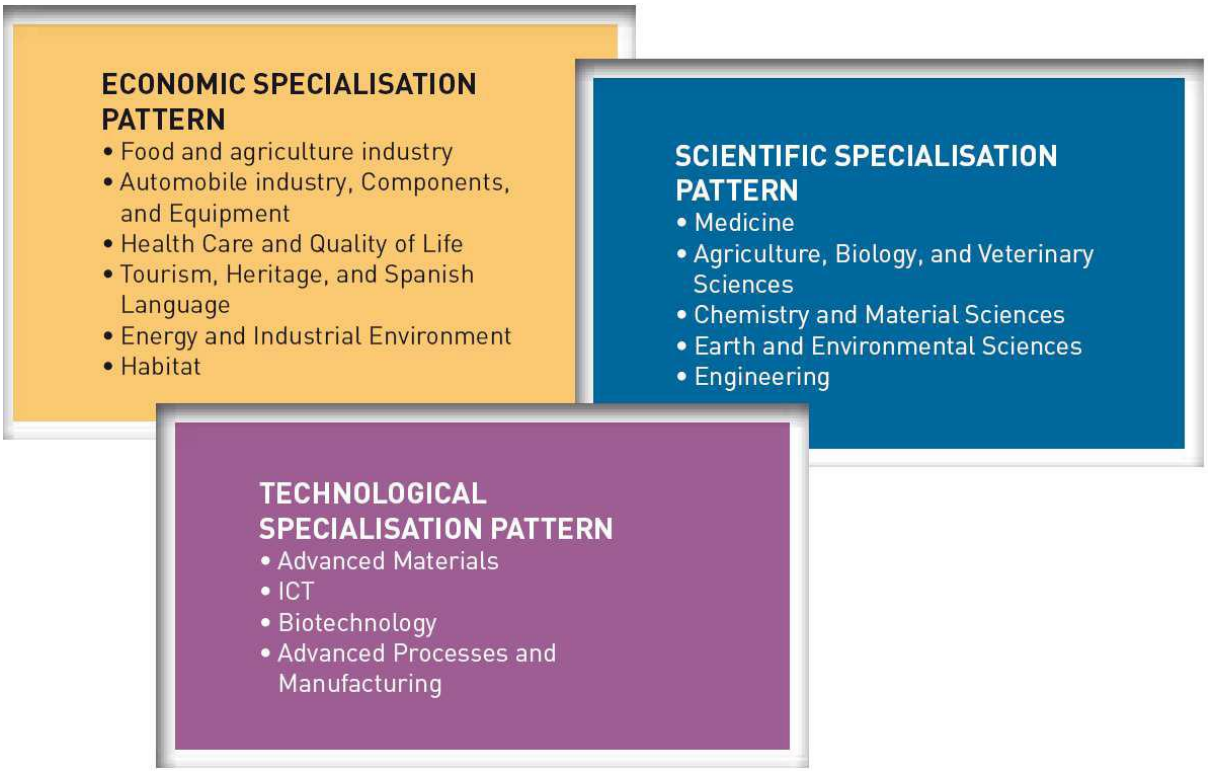
Figure 5: EDP in the Design phase of RIS³: the example of Centre-Val de Loire



Source: Pinna 2015.

As a result of the design phase of RIS³, regions defined their specialization patterns in the economy as well as in science and technology. As an example of this, Figure 6 shows the different components in the case of Castilla y Léon (Spain). In the economic sphere, six macro-activities have been defined that make up for large parts of the business sector, compare positively and competitive to both national and international standards. In science, areas of specific knowledge and potential have been identified according to criteria like academic impact and international cooperation. Technological specialization looked at existing technologies in the region that has potential for competitive and innovative development for each economic macro-activity. Thus, the RIS³ participatory process resulted in a specialization pattern as a combination of this triple perspective of economic, scientific and technological comparative and competitive advantage. Correlations between the three components were analysed. Action priorities were set in fields with high correlations and potential, like agro-food, automobile manufacturing, health or cultural heritage (Junta de Castilla y Léon 2014: 18).

Figure 6: Castilla y Léon Specialization Pattern Components



Source: Junta de Castilla y Léon 2014: 18.

Looking across the cases, regional innovation strategies were built around a number of around five (sometimes more) thematic priorities in relation to prominent key enabling technologies, or cross-sectional areas, in which the application of new products and practices to relevant economic and social activities (co-invention) could take place. Table 1 lists the thematic priorities of the regions represented in the Beyond EDP consortium.

In these vertical domains, action plans have to be developed according to horizontal objectives, which are valid across the different areas of transformative activities in RIS³. These horizontal objectives include the development of a sound knowledge base and specialized human capital for research and development, the strengthening of cooperation networks among stakeholders, the funding of innovative entrepreneurship and research, internationalization and cooperation, the development of cluster policies and the public procurement of innovative products or services (see Foray 2014).

Table 1: Thematic priorities in the partner regions

Region	Thematic Priorities
Burgundy, France	Quality of environment and consumers´ well-being; Advanced materials and processes for secure applications; Integration of biomedical solutions; Eco-design, eco-construction and bio-sourced materials; ICT in mobility and transport
Castilla y Léon, Spain	Agriculture, food industry and natural resources; Efficiency in transport sectors (automobiles manufacturing and aeronautics); Health and social care; Natural and cultural heritage, Spanish language; R&D in ICT, energy and sustainability
Centre-Val de Loire, France	Environmental engineering and metrology for highly resource-consuming activities; Biotechnology and applied services for health and cosmetics; Designing systems for energy storage; Energy efficiency technologies in the construction and renovation of buildings; ICT services for heritage tourism
Centru, Romania	Agrofood; Light industry; Forestry, wood processing and furniture; Automotive and mechatronics; Aerospace industry; ICT creative industries; Wellness tourism; Medicine and pharmacy; Energy efficiency and renewable energy
Extremadura, Spain	Food and agriculture; Clean energy; Tourism; Health sector; ICT
Lodzkie Region, Poland	Modern textiles and fashion industry; Advanced building materials; Medicine, pharmacy, cosmetics; Power engineering, including renewable energy; Innovative agriculture and food processing; ICT
Northern Netherlands, The Netherlands	Agrofood; Energy; Healthy Ageing; Smart (Sensor) Systems; Materials and Water Technology
Östergotland, Sweden	Logistics; New materials; Smart and secure connected products and systems; Simulation and visualization
Saxony-Anhalt, Germany	Energy, engineering, plant construction, and resource efficiency; Health and medicine; Mobility and logistics; Chemistry and bio-economy; Food and agriculture
Umbria, Italy	Green chemistry; Aerospace; Life sciences; Agrofood; Energy

Source: Own illustration, based on information from the regions.

6.2. EDP Governance in the RIS³ Implementation

The sixth and final step of the RIS³ methodology is the establishment of a more permanent participatory governance structure, the allocation of European, national and regional funding for innovation policies, and the creation of a monitoring and evaluation system for the targeted priority areas and horizontal objectives. Hence, we are talking about the ***implementation phase of RIS³*** (European Commission 2012).

In implementing and managing RIS³, there are some nuances to the assigned role of EDP across regions. For some regions, a continuous stakeholder involvement has been envisaged right from the start, whereas in other regions a more piecemeal process took place. In these cases, EDP may not have been originally planned to be part of the whole policy cycle, but became increasingly used in the Q4-Helix for matters of strategic planning, promoting new partnerships and collaborative projects, and facilitating technology transfers. In this sense, EDP was either set or established itself as a modern governance format. It is interesting to note, that many regions reported that the RIS³ design process itself lay the foundations for a more permanent Q4-Helix cooperation in the implementation phase. Yet, the questions of keeping the momentum in stakeholder participation, finding the right policy instruments and policy mixes for transforming thematic priorities into real transformative activities, monitoring and evaluating innovation policies have become relevant issues and learning processes in all of the partner regions in the consortium.

In this framework document, we will highlight two key issues in RIS³ implementation: EDP governance structures and good practices in the partner regions of our consortium. Reflecting on the discussion of the institutionalization of entrepreneurial discoveries, governance structures matter for processes and outcomes. There are regulative, normative and cognitive aspects at play, which shape the behaviour of individual and cognitive actors (see Chapter 5.2.). Who is in charge of steering and managing the evolution of innovation policies in the domains of specialization? Who is active in discovering new ideas, practices and products? In which environments to these processes flourish best? Who is providing feedback, issuing recommendations and taking decisions?

Seen from a governance perspective, the regions in our consortium have opted for a flexible combination of top-down and bottom-up approaches. In managing the regional ecosystems of innovation, structures for a coherent and effective coordination of activities have to be established and combined with the necessities of an open and interactive process in the Q4-Helix format, in which hierarchical leadership is to be replaced by collaborative leadership.

In light of these considerations, most regions have developed a ***three-tiered governance structure*** for managing the implementation phase of RIS³:

- *Steering Groups*, responsible for strategic decision-making and the integration of RIS³ activities, including monitoring and assessment. These bodies are close to the regional government but also include representatives from the wider Q4-helix[9];
- *Management Teams*, which coordinate activities and provide most of the day-to-day work in implementing RIS³. The management teams, often associated with regional innovation agencies, are also involved in the drafting of reports and the exchange with the European Commission, national authorities and other regional innovation agencies;
- *Innovation Environments*, providing the room for a continuous interaction between stakeholders in the Q4-helix within and across the priority areas. At a working level, their input and discoveries serves to uphold regional consensus on innovation policies but also to realize specific projects and programmes.

As an example of such a three-tiered EDP governance structure, Figure 7 shows the case of Extremadura (Spain). Strategic leadership is vested in the Commission of Science, Technology and Innovation, which is chaired by the regional minister for economy and infrastructure. The General Secretary of Science, Technology and Innovation (who is head of department in the ministry for economy and infrastructure) plus representatives from all other ministries of the regional government also form part of this steering body. The Commission collaborates with the RIS³ Technical Committee, which includes members from all regional government departments and agencies in charge of RIS³ programmes as well as experts from universities and centres for scientific research and technology transfer.

The Commission of Science, Technology and Innovation of Extremadura is responsible to the regional government for the planning of R&D and innovation policies. It also monitors the implementation of the RIS³ strategy and caries responsibility for monitoring and assessing the impact of the strategy. The Commission validates evaluation reports submitted to the European Commission as well as possible substantial changes that might be necessary.

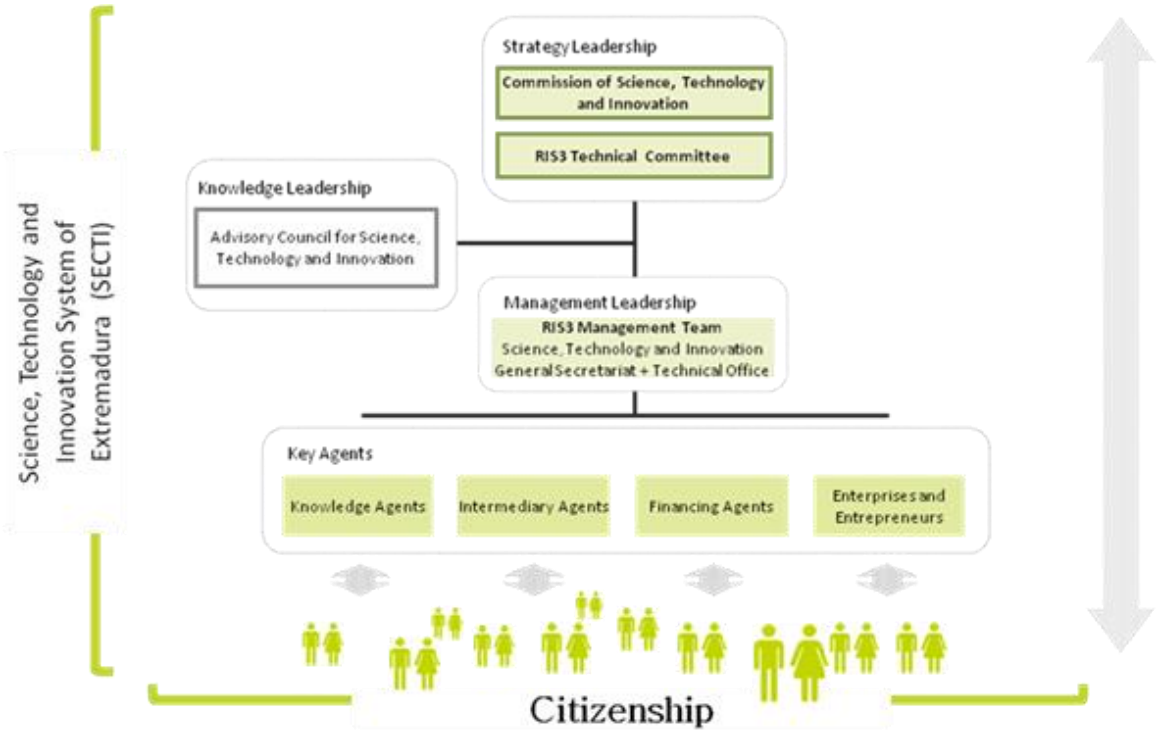
The RIS³ Technical Committee is responsible for the overall development of RIS³, reviewing the annual monitoring reports and assessing the contribution of the different strategic lines to the observed regional socio-economic shifts. When needed, the committee will identify and approve the

[9] While some of the steering bodies have a longer tradition and predate RIS³ management (such as the Advisory Council on Clusters and Innovation in Saxony-Anhalt, others are have been created more recently in the context of the RIS³ implementation. Among these are the Northern Innovation Board in the Northern Netherlands, founded in 2014/15, the Regional Consortium for Innovation in Centru and the Innovation Council for the Lodzkie Region, both established in 2016. All of these bodies are Q4-Helix in format. Yet, they differ in size (with some having around a dozen members and others comprising some 40 to 60 members) as well as in legal and political status.

appropriate corrective actions necessary for improving enforcement of the objectives and aligning the strategic Priorities with the specific regional indicators.

In addition to the bodies of strategic leadership, knowledge leadership is provided by an Advisory Council for Science, Technology and Innovation. It is composed of recognized experts (maximum: 15 members) from the fields of science, research and technological development as well as representatives of business enterprises and trade unions. The members are appointed by the regional government and serve for a period of four years. The advisory council acts as the responsible body for ensuring the RIS³ coherence with regard to the regional scientific-technological capacities. It supervises and assesses the evaluation process outcomes in this area.

Figure 7: EDP Governance Structures in Extremadura



Source: Foundation FUNDECYT Scientific and Technological Park of Extremadura.

At the managerial level, a RIS³ Management Team has been established to support smart specialization, facilitating relations between the different actors involved and fostering the entrepreneurial discovery process. The management team is led by the General Secretariat of Science, Technology and Innovation. It is formed by multidisciplinary professionals that give support to the regional government for the implementation, monitoring and evaluation of RIS³. Its work is supported by a Technical Office (managed by FUNDECYT-PCTEX, the Scientific and Technological Park of Extremadura) providing expertise for the implementation, monitoring and evaluation of the RIS³.

At a working level, key actors of the Q4-helix are engaged in the stakeholder process, bringing in their knowledge and perspectives. Extremadura has established a set of five thematic RIS³ working groups, one for each of the targeted areas of smart specialization. Looking at the range of stakeholders involved, knowledge agents, intermediary agents, financing agents, enterprises and entrepreneurs are also representing the interests of the citizens. This strongly enhances the regional ownership of smart specialization.

Like Extremadura, Saxony-Anhalt has established five thematic working groups, one for each of the regional thematic priorities (known as "lead markets"). They constitute the platforms for continuous stakeholder involvement in the RIS³ implementation. Their work is coordinated by the RIS³ secretariat, the EDP management unit, located at the regional Ministry of Economy, Science and Digitalization.

Similar structures at the working level are to be found in Umbria, to name just another example. Here, thematic working groups have been particular active around the regional priority axes of agro-food and green chemistry. The involvement of local entrepreneurs who are also active in national and regional technology clusters has proved to be an important asset for the development of program agreements in innovation policies. In Castilla y Léon, RIS³ thematic working groups for each priority/specialization area, are actively involved in formulating recommendations for improvements in the regional innovation system, and also in the monitoring of the specialization strategy. However, as we will see in more detail in the next section, there is quite some variation in the ways the working level of EDP is actually structured (see Chapter 6.3.).

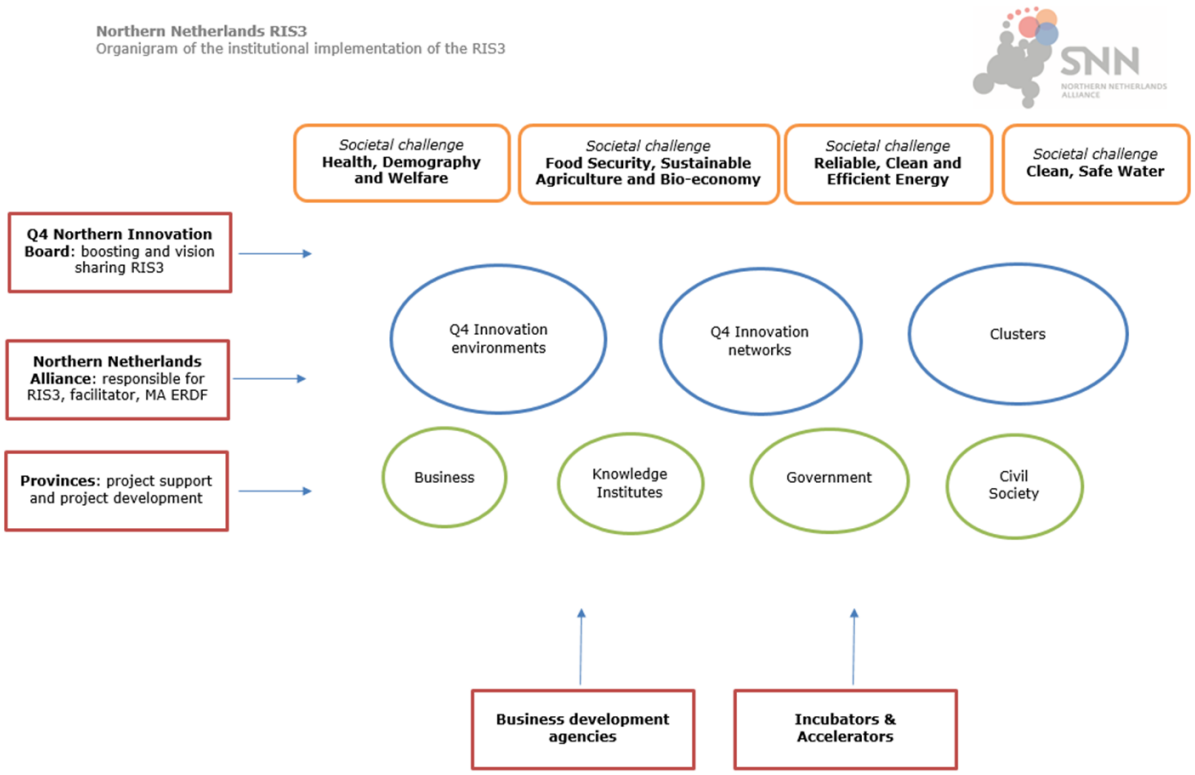
An interesting case for a somehow more decentralized model of EDP governance, whether by design or by default, is to be found in the Northern Netherlands. While there is a steering committee, the Northern Innovation Board, which functions as a Q4-Helix advisory council to the governors and deputies of the three Dutch provinces which make up for the Northern Netherlands Alliance (SNN), its main function is less on governing EDP than on "propelling" specific initiatives in the field of innovation.[10]

As a result, there is a stronger role for the management body, the SNN management authority, in connecting stakeholders, supporting interconnections between innovation activities and fostering EDP around the priority domains. In a similar vein, the different innovation environments – clusters, campuses, hubs, living labs, etc. –, which constitute the EDP working level in the Northern Netherlands are working in a climate in which companies and scientists are constantly searching for new discoveries. In many cases, these environments are truly physical places, locations which include research, incubator and/or living lab facilities. The common denominator for all these initiatives is that they are joint efforts of a combination of companies and universities, facilitated and encouraged by

[10] The Northern Netherlands Provinces Alliance (SNN, according to its Dutch abbreviation) consists of the union of the provinces of Drenthe, Friesland and Groningen (three of the twelve Dutch provinces), located in the northern part of the country. SNN is firstly a coordinating structure, with a political board; secondly, it is a managing authority, responsible for the European Structural Funds programmes; and thirdly, SNN functions as a networking organization: a facilitating body or facilitating cooperation between governments, businesses, knowledge institutes and civil society.

governments. There is a tendency to more autonomous processes around these innovation environments, focusing on a specific theme or societal challenge. Figure 8 illustrates the governance model of the Northern Netherlands.

Figure 8: EDP Governance Structures in the Northern Netherlands



Source: SNN.

6.3. Good Practices in RIS³ Implementation: a Typology

At the working level, regions have pursued quite different ways in making use of EDP in bringing about smart specialization. This reflects the place-based approach that is inherent in the concept (see Chapter 5.1.). In the RIS³ implementation phase, we can identify three broad patterns[11]:

- At a *macro-level* of innovation environments, broad umbrella organizations have been established that are responsible for all sectors and stakeholders interested in innovation within the regional context;
- At a *meso-level* of innovation environments, specific cluster organizations, collaborative structures of interested partners or thematic working groups in a specific field have developed;
- At a *micro-level* of innovation environments, hubs, living laboratories and innovation parks have been created, in which entrepreneurial agents are coming together for specific projects and lines of development.

European regions have been active in building such an ecosystem of innovation, suited to their distinct needs and capacities. They have either concentrated on one of these three types of innovation environments, or have mixed several of them. In some sense, the EDP working level in a region has developed from traditions and opportunities for cooperation that have been there for quite some time in that territory. But there is also deliberate choice, learning from other regions and their good practices, and sometimes an element of chance that has been driving the establishment of innovation environments. Structures that have worked well, or that have become strongly entrenched and supported by powerful players in the region have continued and grown, other structures have withered away over time. Thus, there is a very interesting story to be told about the rationality behind innovation environments in European regions, and the ways they have changed and developed.

A good example for a ***macro-level of innovation environments*** can be found in the Region Östergötland (Sweden). The *East Sweden Business Region (ESBR)* is a broad regional platform for innovation support, established in 2011 by the East Sweden Regional Council. Its creation reflected a perceived lack of coordination among publicly funded organizations and within the wider Q4-Helix environment in the area. In its strategy, the ESBR focuses on regional strengths from which all industries and branches can benefit. The ESBR is a collaboration in which all of Östergötland's actors within the area of growth come together to create attractive, competitive industry with high growth potential. It involves the county's municipalities, marketing agencies, Region Östergötland, Linköping University, the region's science parks, business associations, clusters and a number of other actors. The Swedish Agency for Economic and Regional Growth supports the ESBR (Hunnershage-Sandgren 2017).

[11] In an appendix to this framework document, the „List of Good Practices in the Regions", more information and examples on EDP practices can be found. In the peer review events, that are a key part of this project, the consortium members will engage in an more in-depth analysis of these EDP practices in the RIS³ implementation phase.

The ESBR has been responsible for drafting the RIS³ in the region (ESBR 2015). It has a budget for funding initiatives in the targeted areas (such as simulation and visualization of complex data), but also spends money on more general societal challenges, e.g. health care. Each ESBR partner designates a responsible contact person in each field of action to ensure accurate and efficient communication. For each targeted area, regular meetings take place to keep processes going. These meetings are organized and chaired by a target area manager, who is selected from among the ESBR platform. The overall coordination rests with the RIS³ management team in the Region Östergötland (Hunnershage-Sandgren 2017).[12]

Another example for a macro-level innovation environment is the *Umbria Region High Tech District*, (DTU) created and funded by the regional authorities and the Italian national government. The DTU aims at supporting the innovation capacity of the regional production fabric in the sectors metallurgical specialty materials, micro- and nano-technologies, advanced mechanics and mechatronics. The aim of the DTU is to increase the experience of collaboration between companies and the world of research (both public and private) in the transfer of excellence and linkage with similar national and European experiences. According to regional strengths, four innovation poles, for which innovative projects can be launched, were established in Umbria.

In the *Centre-Val de Loire region*, a series of six innovation platforms (called *PIVOTS*)[13] have been established in 2016, which focus on new technologies for environmental sustainability. In combining public and private stakeholders in the region, the platforms are focusing on issue like water and air pollution, environmental measurement technology and environmental engineering. Innovative solutions for stimulating economic growth are reinforced by academic and industrial collaborations. The platforms are linked to research programmes in the region, such as the "Ambition Research and Developmjent 2020" (ARD).[14] The ARD Lavoisier, for example, is a research partnership for the storage and transport of clean and renewable energies (hydrogen, wind turbine and photovoltaic). In its laboratory in Monts, the platform works for solution to speed up the process of design, development and industrialization of materials and systems turned to new energies.[15] The ARD Biomédicaments, as a second example, is a scientific project consortium covering a wide range of biopharmaceuticals developments, including target selection, bio-manufacturing, bio-conjugation, animal models, pharmacokinetics, imaging, immunogenicity and clinical research, while also incorporating the social dimensions of bio-medicine.[16]

[12] For more information, see http://www.eastsweden.com.
[13] PIVOTS stands for "plateformes d'nnovation, de valorisation et d'optimisation technologique environementales" (platforms for the innovation, valorisation and optimization of environmental technologies).
[14] The ARD programme has been set up by the Centre-Val de Loire region and aims at strengthening research centres, attracting foreign scientific experts and technology clusters. The budget can support each selected projects with up to 10 million Euros.
[15] For more information, see http://www.s2e2.fr/en/road-map/platforms-equipments/lavoisier-ard-platform.
[16] For more information, see http://www.lestudium-ias.com/content/biopharmaceuticals-programme.

At a ***meso-level of innovation environments***, we have already hinted at the thematic *RIS³ working groups* in Saxony-Anhalt, Umbria, Extremadura and Castilla y Léon (see Chapter 6.2.). Other examples that are quite common in all of our regions - and which have some longer traditions in most places - are cluster organizations. Four examples may help to illustrate the role of cluster in EDP.

In the *Lodzkie region* (Poland), an *ICT cluster* convenes 24 partner organizations, including local enterprises, branches of international companies, universities and research institutes as well as public authorities. The partners are working in different sectors but share a common interest in technological innovation for ICT applications to their specific field. In their collaboration, which is organized around some permanent taskforces, they are aiming for strengthening the supply of a skilled ICT workforce in the region, sharing knowledge for innovation, becoming active in international projects, and promoting the interests of the different partners in the cluster.[17]

A second example is the *Innovation Cluster Drachten (ICD)* in the Northern Netherlands, a regional alliance of high-tech companies and knowledge institutes aiming at boosting innovation, manufacturing and competition power. In 2017, 18 companies have been part of the cluster. Through their emphasis on R & D, these companies are all market leaders with an international focus. All companies participating in the ICD share its six main objectives: to attract and commit top talents on all levels; to promote the region´s innovativeness and attractiveness; to share knowledge and to participate in network building; to assist regional "techno-starters"; to prepare and execute complex pre-competitive R&D; and, to open the doors of testing and production facilities to other ICD companies. Trust is an important factor in the cluster´s policies, so all existing members have to consent to the entry of a new partner in the consortium. SME´s are actively approached, based on profiles made by a consultant.[18]

In *Castilla y Léon*, the cluster *Vitartis* represents the food industry sector, one of the most important economic pillars in the region. It comprises many stakeholders from the fields of business, science and technology. In 2017, 51 agro-food SMEs, 20 large size companies, six universities, four technology centres and two public research centres have been members in the Vitartis cluster. The cluster aims at higher competitiveness, the stronger representation of sectoral interests and a more vibrant emphasis on R & D activities in the region. Vitartis maintains permanent working groups on internationalization, innovation, financing and vocational training. The consortium deliberately employs EDP instruments – such as online surveys, regular cluster meetings, workshops, one-to-one business appointments, etc. - in the selection of issues of strategic interest (e.g., projects on 4.0 industry technologies for the food sector) and specific training programmes (e.g., workshops on food companies´ management).

As an example for an inter-regional cluster, the *S2e2 network*, is a large network for smart electricity technologies in *western France*. It is based in the Centre-Val de Loire, Limousin and Pays de la Loire regions. As a competitive cluster for managing electric and thermal energies it aims for innovation by

[17] For more information, see http://www.ictcluster.pl.
[18] For more information, see https://www.icdrachten.nl.

stimulating collaboration between companies and laboratories in the form of R&D projects, whose spin-offs are growth drivers for these companies on the market. The S2E2 convenes over a hundred members, among them companies, SMEs and business groups, universities, research institutions and training organisations. The network supports collaborative R&D projects, contributes to the development of training courses in the cluster's domains, and promotes the sharing of technological skills for the dynamic development of the regions.[19]

The micro-level of innovation environments consists of regional and local cooperations between companies and research institutions, supported by public authorities. Often these are truly physical places, locations which include research, incubator and/or living lab facilities. One of the examples here is the *Water Campus Leeuwarden* in the Northern Netherlands. As a technology hub, it is the meeting point of the Dutch water technology sector and has the ambition to play a sector uniting role for the rest of Europe as well. Water Campus encourages cooperation between (inter)national and regional businesses, universities and research centres,educational institutes and governments within the water technology sector, in order to create synergy for world class innovation, education and entrepreneurship. It offers a unique infrastructure for scientific research, product development and project demonstration.[20] The Northern Netherlands also host several other innovation campuses, including the *Dairy Campus*, a hub for innovations in milk and milk products and the *Healthy Ageing Campus*, which focuses on growing older in a healthy way.[21]

In Saxony-Anhalt, the *Magdeburg Science Port*, located at the Elbe river, has been established as a centre of innovation and technology transfer. Close to the Magdeburg university and research institutions, such as the Fraunhofer Institute for Factory Operation and Automation and the Max Planck Institute for the Dynamics of Complex Technical Systems, university spin-offs and new business start-ups are working together in the Science Port. As innovative firms in fields like process engineering and information technology, they are playing a major role in knowledge transfer from research to practice. Among the key aims of the project is the encouragement of communication among the firms based in the area to generate synergy. One of the tenants in the park is the Virtual Development and Training Center (VDTC), which provides high-tech labs ideally suited for interdisciplinary work between scientists, industrial users and innovative service providers. Focusing strongly on practical applications, interactive visual simulations are jointly developed for virtual product and process development. Besides virtual functional tests, VDTC's research also addresses virtual training.[22]

Saxony-Anhalt also hosts the *Magdeburg research campus STIMULATE* which focuses on image-guided medical engineering. Within the priority area of health and medicine, the regional innovation strategy describes STIMULATE as "a beacon in the research and development of imaging minimal-invasive

[19] For more information, see http://www.s2e2.fr/en. The ARD Lavoisier, to which we have referred above, is also part of the S2e2 network.
[20] For more information, see http://watercampus.nl/en.
[21] For more information, see https://www.dairycampus.nl and https://www.hannn.eu/over-hannn/europa.
[22] For more information, see http://www.wissenschaftshafen.de/Idea-and-Concept?La=2.

diagnosis and treatment methods" (Ministry of Sciences and Economic Affairs of the Federal State of Sachsen-Anhalt 2015: 10). Based on demand, medical engineering specialists develop innovative technologies and solutions, which subsequently become integrated in patient treatment. The aim is to improve medical treatments as well as to help contain of exploding health care costs. In particular, age-related common diseases in the areas of oncology, neurology and vascular diseases are considered.

The focus on application-oriented basic research improves the transfer and translation of ideas and innovations. This specialisation is a particular strength of STIMULATE, as demographic trends and rising incidences, especially of age-related diseases, require a "personalized medicine" with new diagnostic and therapeutic methods. In addition to the activities in research and development, STIMULATE is active in university-level education as well as professional training of physicians and medical technicians. Structurally, the project is a public-private partnership between the Otto-von-Guericke-University Magdeburg, Siemens Healthcare GmbH and the STIMULATE Association, a series of leading regional and international SMEs in the field.[23]

A final example for a local innovation environment within our project consortium comes from the *Life Tech City* in Tirgu Mures, located in the *Centru region* of Romania. It is the country´s first pole of competitiveness in the field of medicine, life sciences and informatics. Bringing together companies, public authorities, universities, hospitals and non-governmental health foundations in the area, Life Tech City aims at supporting and financing R & D projects at the intersection of medicine and the ICT sector. Among the activities are projects for the diagnosis and therapy of children´s cardiac problems and the training of medical staff in emergency medicine.[24]

7. Conclusions

The rapid success of EDP from an academic concept to a political tool in the EU has proved the potential of the idea of smart specialization. At the same time, however, the transfer into political practice has led to a permanent evolution of EDP which raises a series of questions, both in theoretical and in practical terms. Many of the challenges that are driving the current debate are about the management of EDP, the continuity of stakeholder involvement, and the measurement of its impact on regional development. How does it work, how can it be managed effectively how and how can its success be monitored and measured? Our project aims at providing new answers to these set of questions, arising from the experiences made in the regions.

[23] For more information, see https://www.forschungscampus-stimulate.de/en/start/index.html.
[24] For more information, see https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/support-measure/lifetech-city-pole-competitiveness-medicine-life-sciences-and-medical-informatics.

With this framework document, the project consortium is presenting its common vision on EDP management in the various phases of the policy cycle. We start from the idea that three general objectives can be identified for employing entrepreneurial discoveries: making sound choices in defining priorities, implementing and monitoring RIS³ better, and empowering regions. The involvement of many actors and stakeholders in consultation processes and collaborative action is the hallmark of EDP. Inclusiveness is most often associated with the idea of the Q4-Helix involving policy-makers, business people, researchers and representatives of civil society.

The consortium perceives of EDP as a continuous process from agenda setting to policy formulation, decision making and implementation as well as to subsequent assessment and evaluation of chosen policy practices. The role of individual actors throughout the entire process may well vary across the different stages of EDP. Designing EDP governance structures thus has to ensure continuity of interaction but also flexibility in working together. A shared vision of regional development among the stakeholders, a clear understanding of the potentials of cooperation and a promotion of EDP practices are vital for attracting continued participation as a commitment to the region. Regions will have to find a flexible combination of top-down and bottom-up processes in EDP.

With regard to EDP governance structures, the level of regional authority, the level of the institutionalization of such processes and the role of trans-regional cooperation have been discussed in the document. In the "view from below", we reported about EDP practices in the design phase and the implementation phase of RIS³ in our regions. We discovered a three-tiered governance structure as relevant for our cases, consisting of political steering groups (with Q4-Helix formats), management bodies for coordinating actions and a working level of innovation environments. The latter can take on many different forms and many regions have taken advantage of a mixture of macro-level platforms, meso-level working groups and clusters, and micro-level campuses and hubs.

The Beyond EDP consortium will study the management of RIS³ in European regions, and in particular the use of EDP practices for designing priorities, implementing strategies and monitoring effects, in more depth over the next years to come. Taskforces on EDP management, policy mixes and stakeholder involvement as well as peer review events in the different partner regions will be among the main instruments and methods to gain further insights into EDP as the new paradigm of innovation policy.

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9. Glossary of Terms

Entrepreneurial Discovery Process (EDP)	key element of smart specialization, a method to identify desirable areas for innovation and to help implementing such strategies by involving a broad set of stakeholders (quadruple helix)
Europe 2020 Strategy	European innovation strategy for promoting economic competitiveness and high levels of employment by focusing on platform initiatives for smart, sustainable and inclusive growth
Governance Structures (in EDP)	forms of collaborative leadership in reaching decisions, managing and developing innovation policies
Innovation	technological inventions, new ideas, practices and products in the economy and better provisions of public goods, such as education, health and social care, are all part of a broad understanding of innovation in European politics
Innovation Environments	the working level of EDP management in a three-tiered governance structure (steering bodies, management agencies, working level) which constitutes the regional ecosystem for innovation
Institutionalism	scientific concept to understand the role of stable institutions in shaping human behavior due to their regulative powers, normative values and impact on cognitive schemes
Policy Cycle	different phases of the policy process from agenda setting to decision-making, implementation and monitoring, which are divided conceptually for analytical reasons
Quadruple Helix	set of individual and collective actors from the spheres of knowledge institutions (academia), economic enterprises (business), political bodies and administrations (public authorities) and the society at large (civil society), which together constitute the stakeholders in innovation policy

Regional Authority	scientific index for measuring the legislative and administrative competences of regions in terms of their autonomy (self-rule) and their access to the national level (shared-rule)
Regional Innovation Strategies	smart specialization applied to the regional context in the design phase (targeting vertical priorities and horizontal objectives) and the implementation phase (structuring innovation environments for realizing priorities)
Smart Specialization	strategic approach to economic development focusing on targeted support for research and innovation