



Investigating the Impact
of the **Innovation Union**

D8.3 'Assessment of the multi-governance Innovation Union system effectiveness

Deliverable: *Assessment of the multi-governance Innovation Union system effectiveness*
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Version: Final
Quality review: *Pierre Mohnen, UN-MERIT*
Date: 25/10/2018

Grant Agreement N°: 645884
Starting Date: 01/01/2015
Duration: 43 months
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1. Introduction

The Deliverable 8.3 of the I3U project provides an assessment of the institutional reform effectiveness at EU level and in Member States (MS) with reference to innovation. The assessment is carried out, on the one hand, taking into account the evolution of the governance of innovation strategies at EU level, and, on the other, considering the types of governance with which MS manage innovation policies.

In chapter 2, the evolution of the governance of innovation at EU level is associated to the evolution of the concept of innovation over the past 60 years (from 1960s onward), trying to establish a correlation between the type of governance and the changing ideas about what an innovation policy in Europe should be, e.g. which actors involve and how.

In chapter 3, the analysis of the types of governance at MS level is built on the classification of national innovation systems carried out in the I3U Deliverables 9.1 and 9.3, taking stock of the identification of typologies of national innovation systems in “strongly developed” (Austria, Belgium, Denmark, Finland, Germany, the Netherlands, Slovenia, Sweden, and the United Kingdom); publicly policy-led innovation systems (France, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta and Portugal); developing innovation systems (Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Romania, Slovakia and Spain) and lagging behind innovation systems (Estonia, Greece and Poland). The analysis also avails itself of the recent assessment of national innovation systems carried out in the 2017 RIO Observatory and European Semester¹.

Furthermore, the interplay between these two levels, i.e. the European governance of innovation and the national/regional level, is examined according to four points of views:

1. **Subsidiarity principle:** the EU should only stimulate innovation where there is an evident EU added value, though be clearly demonstrated through sound impact assessment procedures.
2. **Empowering EU agencies,** how to manage several funding instruments available for innovation and research, in order to exploit the potential synergies between them and streamline communication with stakeholders.
3. **Coordinate the different levels of governance,** in order to achieve a clearer and more effective coordination between member states (and their regions), EU policies and decision-making when it comes to R&D processes.
4. **Monitoring and evaluation** of the performance of research and innovation policies.

These four aspects of the governance of innovation have been translated in four questions, asking for answers to 14 experts at EU level dealing with innovation from different points of view (academia, research and policy making). The results are shown in chapter 4. The feedback from answering the questions have been treated anonymously and aggregated in order to find out common patterns. In any case, the respondents are not individually responsible for the conclusions showed in the next paragraphs, which must be considered as a solely interpretation by the I3U consortium. Chapter 5 draws conclusions.

¹ <https://rio.jrc.ec.europa.eu/en/country-analysis>



2. The governance of innovation policies in Europe

2.1 Why governance is important

Governance addresses the systems of practices with which governments define priorities, implement policies and monitor the results (OECD, 2005). In its essence, governance can be considered as an interactive process involving at various level partnerships, stakeholders and institutional bodies. The following general definitions allow for the identification of the relevant characteristics of governance; from the OECD MONIT project (OECD, 2005).

- Governance refers to a set of institutions and actors that are drawn from but also outside government.
- Governance identifies the blurring of boundaries and responsibilities for tackling social and economic issues.
- Governance identifies the power dependency involved in relationships between institutions involved in collective action.
- Governance is about autonomous self-governing networks of actors.
- Governance recognises a capacity to get things done that does not rest on the power of government to command or use its authority. It sees government as able to use new tools and techniques to steer and guide.

In the specific context of the management of innovation policies, governance has been gaining a growing importance, to the extent that the conceptualisation of innovation policies has evolved towards the use of “systemic” innovation policy instruments (Edler, Fagerberg, 2017).

As stressed indeed in the I3U Deliverable 9.1 (Verspagen, Hollanders, Noben, 2017) “innovation system theory”, which is the theoretical framework adopted for the analysis of innovation policies and strategies in the I3U project, understands innovation basically as an interactive process, implying the focus on governance and its mechanisms, practices and theories.

The I3U project Deliverable 9.1 has stressed that innovation is not just about R&D being undertaken in a firm’s lab. Indeed, given that innovation at firm’s level must absorb knowledge developed by other actors (either firms, or other, non-private actors), “the way an innovation is designed and applied affects the economy and society at large, involving decisions of other actors, for example the legislative powers, users of the innovation, competitors, banks, etc”.

Governance is therefore the way in which interactions among innovation actors are implemented and organised. The following table shows the relationship between different concepts (models) of innovation and the underlying types of governance, underpinning prevailing taxonomies of innovation policies.

Table 1: Governance and concepts of innovation

| Concepts of innovation | Types of governance | Prevailing taxonomies of innovation policies |
|--|---|---|
| Narrow perspective of innovation: innovation as invention, from knowledge into products | Hierarchical, top-down organisation. | Channelling support to R&D, research and science. |
| Broader and holistic perspective: innovation as a complex process involving funds, knowledge and skills. | Decentralised approach, with a focus on the interaction among the components and actors of the entire innovation cycle. | Range of different policies addressing funding, research, technology and education. |

From the theoretical point of view, it can be said that, following Potts (2017), the two concepts of innovations (“narrow” and “broader”) are rooted in two distinct models: a scientific model of forces, and the corresponding equilibrium model (the narrow concept of innovation); and a scientific model of rules, with the corresponding complexity model, leading to focus on two distinct views of the innovation problem, conceived as a market failure problem, i.e. forces, equilibrium allocation problem, and as a collective action problem, i.e. rules, complex coordination problem.

It has also been pointed out that these two distinct interpretations of the innovation problem translate into two distinct models of innovation policy: one corresponding to government intervention to reallocate resources, and thus solving a market failure problem; the other corresponding to governance in the discovery of effective rules (organizations and institutions) to coordinate collective action.

The two types of governance entail different types of challenges. If the systemic approach to innovation is “nowadays considered as the emerged alternative to the mainstream economics representation of innovation and portrays innovation as a process that is governed by a much broader range of factors than just optimization” (Verspagen, Hollanders, Noben, 2018), it must be said that the implications in terms of type or model of governance are by far more challenging.

The challenge for the governance supporting a system innovation policy is basically the problem of **policy coordination**. System innovation implies a governance model that integrates different policy domains (horizontal co-ordination), among different policy levels (multi-level coordination), with different societal actors (multi-actor co-ordination). This proves to be particularly challenging, and particularly in the European context of 27 MS.

The following sections discuss examples of the extent to which these types of governance have been applied and the major problems encountered, respectively at EU and Member States (MS) level.



2.2 The situation at EU level

The evolution of the governance of innovation policies at EU level follows the evolution of the understanding of policies and causes underlying the origin, development and diffusion of innovation.

Among the several studies carried out over the past years, addressing specific determinants of innovation in Europe like legislation, eg. Pelkmans, Renda (2014) and regulation and R&D policy, e.g. Renda (2016), or providing forward looking views on how to spur innovation (Madelin, Ringrose (2016); the work done by Reillon (2016) represents a useful reference.

The work traces back to the origins of the European innovation policy (in the 1960s) the evolution of concepts and policies addressing innovation, allowing in such a way to follow the dynamics of changing approaches, drawing conclusions in terms of strategic policy implications.

With particular reference to the evolution of models of governance, the periodisation shown in the following sections can provide a useful background.

2.2.1 The early stages (1960-1990): the dominance of the linear model of innovation

The period between 1960 and 1980 is characterised by the dominance of the "linear model" of innovation, according to which innovation is the resulting outcome of a linear process starting from the production of knowledge until the introduction of new products on the market.

As explained in the European Commission communication on the priorities for common policy in research of October 1975, innovation stems "from the laboratory, through industrial application, to the marketing of the products resulting from the research"².

Such an approach led, on the one hand, to a strong emphasis of industrial policy, and, on the other, to a model of governance characterised by a hierarchical organisation, in deep relationships with sectoral industrial priorities.

The policy implementation was indeed carried out by the European Research and Development Committee (CERD), a body established by the European Commission, supported by a European Research and Development Agency to handle the implementation of the decisions.

Among the various European Commission tasks, there was the creation of 'Community industrial innovation and development contracts', in order to support medium-scale projects, initiated either by the industry or by the Commission.

² Objectives, priorities and resources for a common research and development policy, Commission of the European Communities, COM(75) 535, 29 October 1975



2.2.2 The next stages (1990-2010): moving toward complexity

The next stage (1990-2010) progressively moved away from the linear model, acknowledging the complexity of policies supporting innovation, not only understood as a chapter of industrial policy.

The following steps marked the difference with the previous framework:

- The Commission White Paper on Growth, Competitiveness and Employment of December 1993³ recognised that “the linear model of innovation, with the innovative act being isolated, has in today's world been replaced by complex mechanisms”. More specifically, it was stressed that innovation requires constant and organised interdependence between the upstream phases linked to technology, and the downstream phases linked to the market.
- The approach was reaffirmed in 1995, when the European Commission Green Paper on innovation⁴ recognised that “innovation is above all a social phenomenon and a collective process”.
- The Lisbon strategy, adopted by the European Council in March 2000, and the related European Commission communications, described innovation as the result of “a new horizontal policy linking traditional areas such as economic, industrial and research policies”⁵. Such an approach paved the way for the inclusion of a broader portfolio of policy instruments and strategies underlying a successful policy for innovation.
- In September 2006, the Commission published a broad-based innovation strategy for the EU⁶, in which a complex roadmap of 10 actions was designed, addressing among others education, the internal market, the regulatory environment, the IPR framework, the cooperation between stakeholders, the financial instruments and the role of government in supporting innovation.
- In December 2008, in the context of the post-Lisbon strategy, the European Council called for the launch of a European plan for Innovation⁷. In September 2009, in answer to the European Council, the Commission⁸ took stock of the initiatives taken in the past and proposed to the Member States to launch a European Innovation Act before spring 2010.

What were the implications on the governance model arising from the new concept of innovation?

Three important implications must be stressed:

1. acknowledging the need of a complex set of innovation policies determines the growth of

³ Growth, competitiveness, employment – The challenges and ways forward into the 21st century, Commission of the European Communities, COM (93) 700, 5 December 1993

⁴ Green Paper on Innovation, Commission of the European Communities, COM(95) 688, 20 December 1995

⁵ Innovation in a knowledge-driven economy, Commission of the European Communities, COM (2000) 567, 20 September 2000.

⁶ Putting knowledge into practice: A broad-based innovation strategy for the EU, Commission of the European Communities, COM (2006) 502, 13 September 2006.

⁷ European Council Conclusions, ST 17271 2008 INIT, 12 December 2008.

⁸ Reviewing Community innovation policy in a changing world, Commission of the European Communities, COM (2009) 442, 2 September 2009



- programmes⁹, bodies¹⁰, institutes¹¹ and monitoring activities¹², also at sectoral level (e.g. textiles, construction, bio-based products, eHealth, etc.¹³;
2. complexity also implies a fundamental role of actors at regional and at Member States level. Following the implementation of the Lisbon Strategy, indeed, Member States were invited to introduce innovation as a topic in their National Reform Programmes, together with the importance of supporting innovation clusters at sub-national level (regions)¹⁴.
 3. as direct consequences of the growing numbers of actors dealing with innovation at different geographical levels, arise, on the one hand, the risk of fragmentation, and, on the other, the quest for coherence and coordination of innovation policies at EU level.

It is important to stress that this period has put forward the key issues concerning the governance of innovation policies, still dominating the nowadays discussion, namely:

1. coordination and balance between the different EU bodies, avoiding fragmentation and overlapping of competences;
2. coordination of these policies with sectoral policies, reaching an overall coherence;
3. coordination between different governance levels (EU, national and regional) i.e. an efficient application of the subsidiarity principle.

2.2.3 The current stage (2010-): coping with complexity

The current stage, from the Europe 2020 strategy launched on March 2000¹⁵ onward, confirms the broad nature in scope of policies pursuing innovation. The concept of Open Innovation, already set out in 2005, was reintroduced in March 2016¹⁶, stressing the need of a more strategic approach to innovation. The implications for the emerging model of governance are rooted in the previous stage, when complexity of policies supporting innovation was explicitly acknowledged. In particular, the following issues must be pointed out:

- **addressing the risk of growing fragmentation and confusion due to the proliferation of instruments.** In such a context, the revitalisation of the concept of Smart Specialisation

⁹ The fourth framework programme, adopted in 1994, was the first to integrate a specific programme for innovation; programmes for the improvement of business environment for SMEs, from 1989, were renewed and reinforced

¹⁰ In 2003, the European Technology Platforms (ETP) were established, as an industry-led stakeholder forum, to establish a common vision and develop a strategic research agenda in a given area

¹¹ The European Institute of Technology (EIT), an independent body of the EU was set up in 2008, to spur innovation and entrepreneurship across Europe.

¹² The European Trend Chart on Innovation was operational in 2000 as a tool to pursue 'the collection, regular updating and analysis of information on innovation policies at national and Community level. The first European Innovation Scoreboard was published in September 2001

¹³ A lead market initiative for Europe, Commission of the European Communities, COM (2007) 860, 21 December 2007

¹⁴ The European Commission Communication "Putting knowledge into practice: A broad-based innovation strategy for the EU, Commission of the European Communities, COM (2006) 502, 13 September 2006" recognized that "the main competence to foster innovation often lies at regional level".

¹⁵ EUROPE 2020 A strategy for smart, sustainable and inclusive growth, European Commission, COM (2010) 2020, 3 March 2010

¹⁶ 'Open Innovation, Open Science, Open to the World', Speech of Carlos Moedas – Commissioner for Research, Science and Innovation, 'A new start for Europe: Opening up to an ERA of Innovation' Conference, Brussels, 22 June 2015.



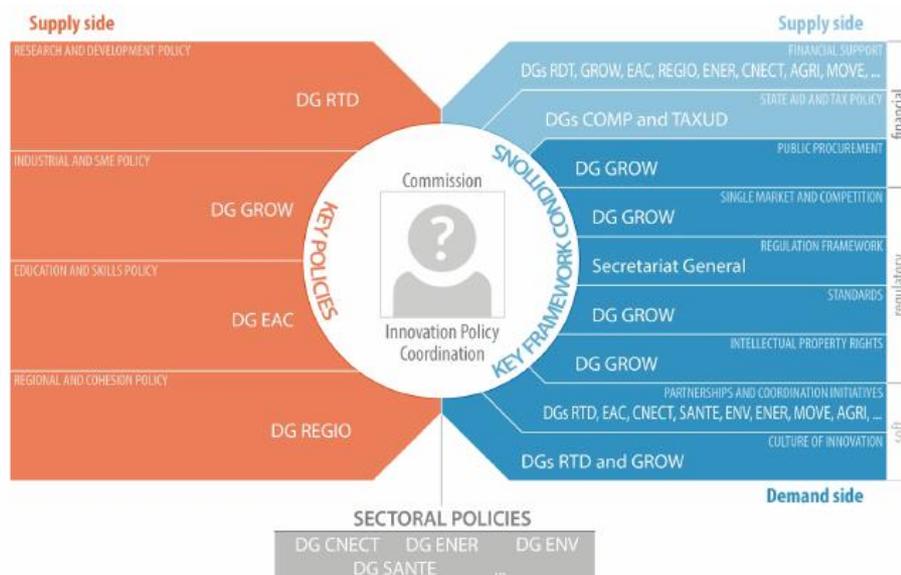
Strategies (established in 1994, but strongly reaffirmed in 2010 and 2016) is emblematic. The concept underlies a strategy that must be developed and agreed by the local actors of the innovation ecosystem, according to which a set of priority areas are defined at the regional level in order to concentrate resources and efforts and avoid spreading investment across a wide range of topics. Smart Specialisation Strategies is to-day a pre-condition for the attribution and use of European Regional and Development Funds in research and innovation.

- moving in the direction of simplification, i.e. to set up a “one-stop shop” through the rationalisation of existing competences scattered in various bodies or programmes.** An example in such direction is the European Innovation Council (EIC) pilot¹⁷, established to provide funding, advice and networking opportunities for companies at cutting edge of innovation and replacing competences spreaded in other EC offices.
- Improving monitoring and evaluation, towards the development of a framework for a better understanding of the impacts of regulation on innovation.** In May 2015, the Commission communication on 'Better regulation for better results'¹⁸ provided a new framework to evaluate and design regulation. It set up the Regulatory Fitness Programme (REFIT) platform to collect suggestions on a 'regulatory and administrative burden reduction research and innovation tool' to assess the impact of the new or existing regulation on innovation.

2.3 Conclusions

Embracing complexity has necessarily led to the multiplication of competences and activities dealing with the support to innovation. The resulting mapping of the European Commission Directorates-General involved in innovation policy (on the demand and supply side) is impressive (Figure I).

Figure I: European Commission Directorates-General involved in innovation policies



Source: Raillon (2016)

¹⁷ <https://ec.europa.eu/research/eic/index.cfm>

¹⁸ Better regulation for better results – An EU agenda, European Commission, COM(2015) 215, 19 May 2015



The implications for the the definition of an efficient model of governance are significant: as stressed before, the multiplication of competences determines, on the one hand, the risk of **overlapping of functions**, raising the quest for **simplification and rationalisation**. On the other hand, **fragmentation of competences risks to reduce transparency**, raising requests of one-stop shop from SMEs, researchers and innovation stakeholders in general.

Furthermore, there is the important aspect of **coordination** among different territorial levels. Given the acknowledged importance of Member States (and regional levels) in managing crucial components or innovation, e.g. from education to tax policy, a new and better framework for governance is required.

In particular, it appears crucial the **enforcement** of the Member States commitment towards the implementation of the National Innovation Strategies, trading off the principle of subsidiarity and balance of competences.

3. The governance of innovation policies in Europe: insights from the I3U results

The analysis of the European national innovation systems has been conducted in the WP9 (Integration – The European Innovation Systems, Deliverables 9.1 and 9.3) and in the WP8 (the assessment of the Commitment 33 on the state of implementation of the Member States Reforms Programmes- Deliverable 8.1).

What contributions these analyses can provide to the evaluation of the effectiveness of the institutional reforms, with particular reference to the definition of an efficient model of governance?

At this purpose, the next section builds upon the classification of national innovation systems carried out in the I3U Deliverable 9.3, assuming this classification as a framework for the interpretation of the insights from the analysis and monitoring of national research and innovation policies carried out in 2017 in the RIO Observatory and European Semester¹⁹.

The objective is to identify trends and patterns in governance models associated with performances of national innovation systems.

3.1 Governance trends and issues at MS level

The methodology underlying the analysis of governance trends at MS level is based on the cluster of 4 types of countries carried out in the I3U Deliverable 9.3. Each cluster of countries has been identified with the aim to single out differentiated patterns of policy instruments. In this section, the cluster of countries are examined to find associations with type of governance and the efficiency of institutional reforms with specific reference to innovation.

The primary source is the DG Research and Innovation R&I Observatory country report 2017, which provides a brief analysis of the R&I system covering the economic context, main actors, funding trends & human resources and policies to address R&I challenges, other than a review of R&I implementation with reference to national and regional Smart Specialisation Strategies²⁰. Literature review on innovation agencies has also been used; in particular, NESTA (2016).

The following sections show for each cluster of EU country the main actors of innovation strategies, the type of governance (relation with government) and the emerging challenges in the governance model.

¹⁹ <https://rio.jrc.ec.europa.eu/>

²⁰ <https://rio.jrc.ec.europa.eu/en>



3.1.1. Strongly Developed (Austria, Belgium, Denmark, Finland, Germany, the Netherlands, Slovenia, Sweden);

Austria

| Main actors | Type of governance | Challenges for governance |
|---|---|---|
| The Research Promotion Agency (FFG) is the national funding agency for industrial research and development in Austria. It is a Private limited company owned by the Austrian Federal Government, with shared ownership from the Federal Ministry of Transport, Innovation and Technology (BMVIT) and the Federal Ministry of Science, Research and Economy (BMWFW). | R&I policy is relatively centralised at national level; with direct cooperation between government levels and a mix of federal and state funding. In the last two years, FFG has also started running entirely regional programmes, directly commissioned by the state governments. According to Michael Binder, who sits within the FFG Strategy Unit, the agency now aims to act as a “service agency for the länder” (NESTA, 2016) | Sectoral: Innovation strategies implementation processes have been monitoring and reporting mechanisms in place, but they vary from region to region and a summative analytical work is still missing. |

Belgium

| Main actors | Type of governance | Challenges for governance |
|---|--|--|
| Innovation support is governed by the regions through dedicated agencies. In Flanders, Flanders Innovation and Entrepreneurship (AIO) acts as a one-stop-shop for all guidance and support for businesses, including innovation support, while Innoviris and the Agency for Enterprise and Innovation (AIE) take up this role in the Brussels Capital Region and the Walloon Region, respectively. The Federal Government is in charge of the federal scientific institutes, intellectual property (IP) law, standardisation, fundamental metrology, nuclear energy research, polar research, defence research, public health research, corporate taxation, employment legislation and social security. | The Belgian research system is highly “devolved” due to the federalisation process of the last 28 years that has gradually split competencies and transferred them from the federal level to the regions and communities. Regional development strategies have expanded their initial science/technology focus to encompass innovation more broadly. Wallonia and Flanders, in their efforts to streamline and simplify research and innovation support, recently merged the agencies responsible in their regions. | Sectoral: The lack of evaluation of potential overlaps between the many support instruments across the regions and communities is an issue. |

Denmark

| Main actors | Type of governance | Challenges for governance |
|--|---|--|
| The main responsibility for research and innovation lies with the Ministry of Higher Education and Science. As of January 2017, the Ministry is divided into two Agencies: The Danish Agency for Science and Higher Education and The Danish Agency for Institutions and Educational Grants. | The type of governance is centralised, promoting research and innovation, with a well-established and centrally organized funding infrastructure. Several policies to enhance collaboration between actors in the system have been implemented in the past, including funding of 22 | Sectoral: There is a need for stronger links between the players in the R&I system to foster knowledge transfer and firms' performance. An analysis conducted by the Ministry of Science and Higher Education showed that on average productivity is 15 per cent higher among Danish R&D- |



| | | |
|--|--|---|
| <p>Furthermore, the Ministry of Industry, Business, and Financial Affairs have tasks related to innovation. Several sectoral ministries; the Ministry of Energy, Utilities and Climate, the Ministry of Environment and Food, and the Ministry of Foreign Affairs, all have larger R&I programmes. These ministries have specific agencies, which implement the respective policies.</p> | <p>innovation networks.</p> <p>At the regional level, six regional growth fora have, to a large extent, focused on innovation in the private sector.</p> | <p>performing firms that cooperate with universities and public research institutions than for R&D-performing firms that do not engage in such cooperation (Research and Innovation in the European Semester Report Denmark, 2017).</p> |
|--|--|---|

Finland

| Main actors | Type of governance | Challenges for governance |
|---|---|--|
| <p>The Finnish Funding Agency for Innovation (TEKES) is steered and funded by the Ministry of Employment and Economy, it provides financing for R&D and innovation projects and works with innovative companies and research units across Finland. Tekes' support for business is part of a broad set of public sector innovation interventions, alongside the activities of various government departments, Sitra (a public funding agency that reports directly to Parliament), and the Academy of Finland.</p> | <p>Tekes places a premium on its relationship with business. TEKES's Christopher Palmberg suggests that the organisation's 'guiding light' has been to respond to demand from industry, and to create a funding environment where broad thematic areas may be set, but that is then very open to competition and new ideas (NESTA, 2016).</p> | <p>Sectoral: Limited cooperation with the main stakeholders, e.g. the lack of justification for budgetary cuts, can be assessed as posing a threat to the success of reforms (high education area).</p> |

Germany

| Main actors | Type of governance | Challenges for governance |
|---|---|--|
| <p>The Federal Ministry of Education and Research (BMBF) is the key actor supporting innovative projects and ideas in research through targeted funding programmes. Funding is provided for projects in a wide spectrum of research areas. The range covers basic research in natural sciences, environmentally friendly sustainable development, new technologies, information and communication technologies, the life sciences, work design. The activity also includes structural research funding at institutions of higher education to innovation support and technology transfer.</p> | <p>R&I is a shared responsibility of the Federal Government and the 16 Länder. At the federal level, the Federal Ministry of Education and Research (BMBF) cover most of the responsibilities for research policy. The Federal Ministry of Economics and Energy (BMWi) is involved in some areas of innovation and technology policy.</p> | <p>Sectoral: Improvement of governance of innovation should address a clearer focus on implementation steps and goal achievement of the strategy or a stronger emphasis on evidence-based evaluations for continuous policy improvement. In specific cases, as in the High-Tech Strategy, a more centralized governance within the Federal government, e.g., a dedicated digital ministry or innovation agency, would improve the governance.</p> |

The Netherland

| Main actors | Type of governance | Challenges for governance |
|--|--|--|
| <p>The main policy actors in R&I are the Ministries of Economic Affairs and Climate (EAC) and Education, Culture and Science (ECS). EAC and ECS share the responsibility for enterprise policy, which includes innovation policy. ECS is responsible for science and education policies and the allocation of institutional funding to the universities. The main R&I policy implementation bodies are the Netherlands Organisation for Scientific Research (NWO), the Royal Netherlands Academy of Arts and Sciences (KNAW), and the Netherlands Enterprise Agency (RVO). Non-profit organisations and foundations do not play a large role in R&I funding in the Netherlands</p> | <p>The governance of R&I policies in the Netherlands is mainly centralised at the national level. The central government remains the main financing body, but policymaking and focus areas are gradually becoming more regionalised. Direct support to business R&I is also increasingly provided at the regional level, partly because R&I have become more prominent in the EU Structural Funds.</p> | <p>Sectoral: In challenge-oriented R&I policy, the government cannot rely on generic policy instruments, but has to play an active role in finding and creating innovation routes towards the transformative change that is needed to address the Grand Societal Challenges (GSCs). Currently, there are many boundaries and barriers between various policy domains within the central government and across the various levels of government (local-regional-national).</p> |

Sweden

| Main actors | Type of governance | Challenges for governance |
|--|--|--|
| <p>The system is characterised by a very large academic sector and a few of very large and R&D-intensive companies. There are two major agencies in the R&I policy area, the Swedish Research Council (Vetenskapsrådet) and the Swedish Agency for Innovation Systems (Verket för Innovationssystem, VINNOVA), who both distribute funding for research and innovation in open calls and in specific areas and programs on instruction by the government. They are also important actors in providing policy advice to the government. The Swedish Higher Education Authority (UKÄ) is responsible for the statistics on the higher education sector alongside with Statistics Sweden (SCB).</p> | <p>VINNOVA, the national innovation agency, has an arm's length relationship with its sponsoring Ministry of Enterprise, Energy and Communications. The organisation operates on a four year budget (set out in the government's multi-annual Research and Innovation Bill, which VINNOVA feeds advice into) and designs its own programmes and targets, which are then presented to government.</p> | <p>Sectoral: There are signs that the Swedish research, education and innovation systems are in need of other improvement reform besides resources increases (OECD 2016). The government has taken limited action based on the public inquiries that have been launched. In the end of 2018 the government awaits the report from an inquiry on the university governance and resource allocation system to the universities.</p> |

Slovenia

| Main actors | Type of governance | Challenges for governance |
|--|--|---|
| <p>The key actor of R&I policy is the Ministry of Education, Science and Sports (MESS). Technology development and innovation activities are in the hands of the Ministry of</p> | <p>The multiple actor framework makes smooth coordination imperative, and there are still issues to be solved. At executive level, Slovenia took inspiration from the Scandinavian</p> | <p>Systemic: Slovenia lacks of an effective governance structure for R&I due to weak coordination across responsible departments and collaborative links between major</p> |

| | | |
|--|--|---|
| <p>Economic Development and Technology (MEDT). Since being in charge of the coordination of the Smart Specialisation Strategy, the Government Office for Development and European Cohesion Policy (GODC) is increasing its role in R&D policy.</p> | <p>model of agencies and established the Slovenian Research Agency (SRA), which is in charge of the distribution of public research funding according to the policies decided by the MESS and the government.</p> <p>On the other hand, the Ministry of Economic Development and Technology finances partly the Slovenian Enterprise Fund and runs the Public Agency for Entrepreneurship, Internationalisation, Foreign Investments and Technology (SPIRIT), established in 2014. SPIRIT is their executive agency for the calls directed to innovation and technology development promotion, but focuses primarily on the promotion of entrepreneurship.</p> | <p>stakeholders in innovation policy. The split of the technology and innovation competences in 2 different Ministries, makes coordination difficult.</p> |
|--|--|---|

3.1.2. Publicly policy-led innovation systems (France, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta and Portugal)

France

| Main actors | Type of governance | Challenges for governance |
|---|---|---|
| <p>Different governmental entities are involved in R&I policy making: the main ones are the Ministry for Higher Education, Research and Innovation (MESRI), the Ministry of the Armed Forces, the Ministry for Solidarity and Health, the Ministry for the Ecological and Inclusive Transition and the Ministry of Ecological and Solidarity Transition, whereas the Ministry of Economy and Finances is also involved in fiscal aspects of R&D policies. In addition, to government ministries, the High Commission for Investment (CGI), placed under the Prime Minister's authority and in charge of the Investments for the Future Programme (PIA), set up in 2010. Regions tend also to play a growing role in this field.</p> | <p>The coordination among actors is first achieved through the inter-ministerial R&D budget or MIREs (Mission Interministérielle Recherche et Enseignement Supérieur, the Inter-ministerial budget mission for higher education and research). However, neither the Ministry for Solidarity and Health nor the CGI are integrated within the MIREs. The transformation in December 2017, of the CGI into SGI and a renewed participation of the MESRI on R&D and innovation decisions of SGI are aimed to achieve a better coordination in the French R&I system.</p> | <p>Sectoral: A high degree of complexity remains and overall coordination is a challenge. The discrepancy between the amount of public support granted and France's middling innovation performance raises questions about the efficiency of public support schemes.</p> |

Ireland

| Main actors | Type of governance | Challenges for governance |
|--|---|---|
| <p>The government is involved in R&I</p> | <p>The Irish R&I system is fairly</p> | <p>Sectoral: The low degree of business-</p> |



| | | |
|--|---|---|
| policy development and implementation through two key ministries: the Department of Jobs, Enterprise and Innovation (DJEI) and the Department of Education and Skills (DES). | centralised with the bulk of R&I budgets being controlled by ministries aka Government Departments. | academia collaboration has been recurrently highlighted. Ireland would benefit from the rationalisation of the wide range of small scale grant-based schemes. |
|--|---|---|

Italy

| Main actors | Type of governance | Challenges for governance |
|---|---|--|
| A key role is played by the central government, namely the Ministry of Education, Universities and Research (MIUR) and the Ministry of Economic Development (MISE). | Cooperation between academia and business in Italy remains limited, thereby hampering an efficient transfer of knowledge or leverage effect on firms' R&D investment. | Sectoral: A range of structural factors like the lack of high-skilled people, limited cooperation between academia and business and unfavourable framework conditions undermine the governance of innovation policies in Italy. |

Latvia

| Main actors | Type of governance | Challenges for governance |
|--|---|--|
| The Ministry of Education and Science (MoES) has a pivotal role to play in developing R&I policy. MoES designs and coordinates public policies when it comes to research and education and supports project financing instruments and the Smart Specialisation Strategy. Its subordinate institution, the State Education Development Agency (SEDA), often implements the programmes designed by the MoES. The role of SEDA in the governance of EU funds for R&D is expected to decrease in the period 2014-2020 due to the planned consolidation of the system. However, this agency will still play an essential role in policy planning. | The governance is complex, with several bodies involved in the strategic planning and supervision (Ministry of Finance (MoF), Ministry of Education and Science (MoES), Ministry of Economics (MoE), Sectoral ministries), Research administration (Central Finance and Contracting Agency (CFCA), Study and Research Administration (SRA), State Education Development Agency (SEDA), Latvia Council of Science (LCS) and Research performance (Public and private research institutions and Higher Education Institutions (HEIs). | Systemic: Public research funding remains fragmented and regulations for the assessment of projects are complex. At the request of the Latvian authorities, a specific support under the European Commission's Horizon 2020 policy support facility has been launched to develop concrete recommendations in this area including governance and organisational aspects. |

Lithuania

| Main actors | Type of governance | Challenges for governance |
|--|--|---|
| The Ministry of Education and Science and the Ministry of Economy remain the two main bodies responsible for RDI policy, while several agencies distribute funding. The Strategic Council for Research, Development and Innovation is responsible for the overall coordination of the RDI policy and its role might be strengthened as | The governance is fragmented, due to several agencies distribute funding. The RDI policy remains fragmented, also at academia level, leading to duplications of RDI activities and a lower efficiency. | Systemic: Aware of the fragmentation in the research and higher education networks, the Government started in 2017 a process of optimisation. In June, the Parliament approved the plan of the optimisation of the public universities' network. |

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| <p>it is also responsible for the implementation of the "science and innovation policy reform guidelines". The research and higher education monitoring and analysis centre (MOSTA) is the main analytical institution, also responsible for the monitoring of the Lithuanian smart specialisation strategy</p> | | |
|---|--|--|

Luxembourg

| Main actors | Type of governance | Challenges for governance |
|--|--|---|
| <p>The Ministry of Higher Education and Research (MESR) is in charge of all public research performers and implements policy. The primary public research funding agency, the National Research Fund (NRF) is also overseen by the MESR.</p> | <p>Luxembourg's R&I system is centralised and well-defined and its governance is simple and straightforward.</p> | <p>Sectoral: Significant efforts have been made to concentrate geographically the most important R&I actors in a single site campus in Belval in addition to merging two public research centres into the Luxembourg Institute of Science and Technology (LIST).</p> |

Malta

| Main actors | Type of governance | Challenges for governance |
|---|---|--|
| <p>The Parliamentary Secretary for Financial Services, Digital Economy and Innovation (within the office of the Prime Minister) is responsible for research and innovation strategy and policy, delegating this responsibility to the Malta Council for Science and Technology (www.mcst.gov.mt). The MCST also manages the local Fusion Programme, is the national contact organisation for the Horizon 2020 programme, and is responsible for science communication.</p> | <p>As a result of Malta's small size, the R&I governance system is highly centralised with a relatively simple and stable structure with well-defined responsibilities.</p> | <p>Sectoral: As a consequence of a dependency on short-term project funding, there is a lack of continuity in research activity leading to loss of institutional knowledge, and the research 'team' rarely reaches the critical mass necessary for the development of excellence.</p> |

Portugal

| Main actors | Type of governance | Challenges for governance |
|--|--|--|
| <p>The two entities within government in charge of R&I policy are the Ministry for Science, Technology and Higher Education (MCTES) and the Ministry for the Economy (ME).</p> | <p>The governance and finance systems of Portuguese universities do not provide the most efficient environment for university-business cooperation and innovation.</p> | <p>Sectoral In spite of efforts made, obstacles to more structured university business cooperation and knowledge transfer remain, hampering innovation and the transition to a knowledge based economy.</p> |

3.1.3. Developing innovation systems (Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Romania, Slovakia and Spain)

Bulgaria

| Main actors | Type of governance | Challenges for governance |
|--|---|---|
| <p>The Ministry of Economy (ME) defines the national innovation policy and provides (national) funding predominantly to private enterprises for applied research through the National Innovation Fund (NIF). The public segment comprises of the state-owned higher (or tertiary) educational institutions, public research organizations (mainly the two leading academies - Bulgarian Academy of Sciences (BAS) and the Agricultural Academy (AA), both guided by separate laws) and other public research institutes (centres/labs) under different sectoral ministries or agencies. The private segment covers private performers, which could be higher institutions (i.e. private universities), private research organizations (including registered as non-profit NGOs) or enterprises, involved in R&D&I.</p> | <p>The system is highly centralised in terms of regulation and control, and the regions (NUTS II), the districts (NUTS III) and the municipalities have limited responsibilities in the area of higher education, R&D and innovation policy. The competences have been clearly divided between the Ministry of Education and Science (oriented towards the public segment) and the Ministry of Economy (dealing with the private sector). Governance suffers of an inefficient structure, not integrated with private sector, compounded by inadequate incentives for high-quality research, a lack of effective policies to strengthen research-business cooperation, and a weak human resources base.</p> | <p>Systemic: (i) poor administrative capacity and insufficient reliance on performance-based funding allocation; (ii) the fragmentation of the R&I system and lack of systematic dialogue and incentives for stronger cooperation between academia, research and business; (iii) the lack of a comprehensive update of the research infrastructure mapping with a systematic prioritisation; and (iv) the lack of synergies with the smart specialisation process.</p> |

Croatia

| Main actors | Type of governance | Challenges for governance |
|---|--|--|
| <p>Within the government, the Ministry of Science and Education (MSE) is responsible for effective science policy and the functioning of the entire research system, while regional policies are weak due to the poor regional financial base for R&I. The MSE is supported by the National Council for Science, Higher Education and Technological Development (NCSHETD), as an independent advisory body in the domain of scientific research, and by the National Council on the Development of Human Potential (NCDHP) in the domain of education for the development of the Croatian Qualifications Framework.</p> | <p>The governance of the R&I system in Croatia is centralised at the national level and lies with the Parliament and Croatian Government, which take key decisions regarding legislation and changes in research organisation and institutions</p> | <p>Systemic: The national R&I system is fragmented and that this negatively affects its performance. Sectoral reforms in governance should address fragmentation and lack of international integration and a below EU average rate of new graduates in science and engineering.</p> |

Cyprus

| Main actors | Type of governance | Challenges for governance |
|--|--|--|
| The Council of Ministers currently acts as the political decision making body for R&I policy. The Directorate General for European Programmes, Coordination and Development (DG EPCD), is responsible for the design of R&I policy, the funding of which relies heavily on EU Structural Funds (ESIF). | The existing Governance system has proven to be rather inflexible and has been inactive for the past few years. However, this is meant to be a temporary arrangement and the lack of a concrete R&I governance structure remains a key shortcoming of the Cyprus R&I system which needs to be addressed. | Systemic: The R&I policy system lacks systematic long term strategic planning based on the input of all relevant stakeholders and the outcome of regular evaluation exercises. The main R&I policy design bodies foreseen in the existing national R&I governance structure, namely the National Research and Innovation Council (NRIC) and the Cyprus Scientific Council (CSC) are currently inactive. |

Czech Republic

| Main actors | Type of governance | Challenges for governance |
|--|--|---|
| The Council for Research, Development and Innovation (CRDI) is the main advisory government body for RDI policy. The Ministry of Education, Youth and Sports (MEYS) is the central administrative authority for R&D in the public sector. The Ministry of Industry and Trade (MIT) administers policies in the domain of business RDI. The Technology Agency of the Czech Republic (TA CR) provides competitive funding for applied research, experimental development and innovation. The Czech Science Foundation (GA CR) provides funding for competitive grants in basic research. | The existing Governance system is complex. So far RDI policy making has been fairly centralized in terms of level of governance geography. Regional authorities do not have any legally binding responsibilities in RDI policy and their main role has been in catalysing the EU Structural Funds. | Systemic: Governance of the R&I system suffers from a lack of coordination, fragmented division of competences and poor evaluation standards. National R&I programme evaluations continue to suffer from poor quality and ex-ante, on-going, ex-post evaluations and impact analyses are not regularly conducted according to international standards. |

Hungary

| Main actors | Type of governance | Challenges for governance |
|--|---|--|
| The central governmental actor in the Hungarian RDI system is the National Research, Development and Innovation Office (its Hungarian abbreviation is NKFIH), which is responsible for the realisation of the governmental RDI policy, setting the national RDI strategy and managing the RDI funds. | The Development Policy Coordination Committee – composed of representatives of the Managing Authorities and the Prime Minister's Office – is focused on coordinating relevant development policy initiatives funded from the EU Structural and Cohesion Funds. The highest-level forum of policy consultation and coordination has also been re-organised a few times | Systemic: Governance lack of efficient coordination. The government's economic strategy puts emphasis on promoting innovation, but weaknesses in policy coordination tend to limit results. The National Research and Development and Innovation Strategy (2013-2020) laid down policies explicitly targeting innovation in SMEs. However, there are mismatches between the planned |

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| | <p>during the past 5-10 years. It has been re-structured under various names and with changing membership and responsibilities even under the current government (since 2010). However, the changes have not helped in giving weight to the role and decisions of the responsible committees.</p> | <p>measures and the actual situation of SMEs.</p> |
|--|---|---|

Romania

| Main actors | Type of governance | Challenges for governance |
|--|--|--|
| <p>In January 2017, the National Authority for Scientific Research and Innovation (NASRI), responsible in the past years for R&I policy and for the coordination of the national R&I system was restructured as the Ministry of Research and Innovation (MRI). MRI is responsible for the overall implementation of the two main funding instruments of the National R&I Strategy: the National Plan for RDI 2015-2020 (NP3) and the Competitiveness Operational Programme (COP), Axis 1, for which acts as intermediary body. The NP3's execution was outsourced to a large extent to the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), but also to the Romanian Space Agency (ROSA) and to the Institute for Atomic Physics (IFA).</p> | <p>The R&I governance is characterised by excessive and burdensome bureaucracy, predisposition to over-regulation, frequent legislative and institutional changes, lack of human resources. In less than two years period, five ministers held responsibility for RDI, under four distinct governments. The political changes affected the RDI policy and system, triggering delays, ad-hoc changes. Coordination mechanisms and organisms are set-up in theory; yet they may be deemed as insufficient in the absence of human resources, of political determination and culture willing to make them functional.</p> | <p>Systemic: There is still weak coordination between the national and the regional levels in a coherent innovation system. High fragmentation in public research performance, with more than 150 public institutions undertaking R&D, and inefficient technological transfer policy remain issues to be tackled.</p> |

Slovakia

| Main actors | Type of governance | Challenges for governance |
|---|---|--|
| <p>The key advisory body for coordination of the Slovak S&T policies is the Slovak Government Council for Science, Technology and Innovation (SGCSTI). The central government ministries, HEIs, research institutions and industry and employer associations have their representatives in the council. The council, however, is an advisory body of the Slovak Government in matters of science, research and innovation and has no executive powers in research and innovation (R&I) policies. The council is chaired by the Prime Minister. Co-chairs of the SGCSTI are the Minister of Education,</p> | <p>The Slovak Republic type of governance is centralised. The central government has all competences in science and technology policy (S&T) and higher education. The eight regional governments have some limited competences in secondary education and vocational training, and regional innovations</p> | <p>Systemic: Insufficient coordination and co-operation between ministries and their agencies and also fragmentation of resources for building R&I infrastructures are seen as major challenges for Slovakia.</p> |



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| Science, Research and Sport of the Slovak Republic, Minister of Economy of the Slovak Republic, Minister of Finance and Chairman of the Slovak Academy of Sciences. | | |
|---|--|--|

Spain

| Main actors | Type of governance | Challenges for governance |
|--|---|---|
| The Ministry of Economy, Industry and Competitiveness (MEIC) is the main organisation responsible for the proposal and execution of government policy on R&I. The State Secretary for Research, Development and Innovation (SEIDI) supports MEIC with the implementation of R&I policies. Its tasks include participation in the execution of central government policies on R&I, the supervision of public research bodies (OPIs), coordination with regional R&I bodies, and international representation of the Spanish government on R&I issues. | The R&I structure includes several actors across and policy roles (i.e. policy-making, implementation and policy advice), making as result a complex structure. | Sectoral: The reduced mobility of academics and the rigidity of the university governance system are obstacles to closer cooperation, together with the excessive bureaucracy that guides the activity of the Offices for the Transfer of Research outcomes. The governance and efficiency of the Spanish R&I system is also challenged by the limited coordination of R&I policy among national and regional administrative units, the fragmented character of the scientific system. |

3.1.4. Lagging behind innovation systems (Estonia, Greece and Poland)

Estonia

| Main actors | Type of governance | Challenges for governance |
|--|---|---|
| The Organisation of Research and Development Act provides the framework for the structure of the Estonian research and innovation system. According to this law, the Government of the Republic prepares national R&D development plans, submits them to the Riigikogu (Parliament), approves national R&D programmes, ensures the cooperation between the ministries and enacts legislation | Estonia has a particularly strong decentralisation culture between ministries (making coordination rather difficult) and also between ministries and their respective agencies. | Systemic: The problems of mismatching specialisations in public and private R&D profiles are ingrained in respective governance structures as well. Thus, Estonia has a quite strongly disjointed RD&I policy governance structure. For instance, in evaluating research proposals at the Estonian Research Council there is no input from Enterprise Estonia, or from other outside agencies or industry associations. Such problems are endemic across the policy landscape. Also important is the general weakness of mediating or networking organisations, as well as civil society's role in R&D and innovation policy. This is particularly important for the business sector whose policy positions are more scattered, with |

| | | |
|--|--|---|
| | | diverse interests and much less involvement in policy making. |
|--|--|---|

Greece

| Main actors | Type of governance | Challenges for governance |
|---|--|---|
| <p>The National Council for Research and Innovation (NCRI) is the supreme State advisory body for national policy for research, technology and innovation. The responsibility of funding research is shared between the Ministry of Education, Research and Religious Affairs and the Ministry of Economy, Development and Tourism.</p> | <p>The governance system in Greece is currently under modification, due to the need to establish framework conditions supporting economic development.</p> | <p>Systemic: Reforming governance is a crucial passage towards stabilisation. The strategy consists of 8 axes: 1) policy development and implementation, 2) Procedures and infrastructure, 3) Local governance, 4) Human resources, 5) Regulatory governance, 6) Transparency, accountability and open governance, 7) e-governance strategy and 8) Fight against corruption.</p> |

Poland

| Main actors | Type of governance | Challenges for governance |
|---|--|--|
| <p>The governmental R&I policies are coordinated by the inter-ministerial Council for Innovativeness. The Ministry of Economic Development (MR) develops and implements the innovation policies. MR is also a managing authority overseeing the absorption of the European Structural and Investment Funds (ESIF), coordinating activities of funding agencies. The Ministry of Science and Higher Education (MNiSW) supervises the research policies, including higher education and public research organisation sectors, and distributes the national science budget</p> | <p>The Polish R&I system is centralised as regards funding and governance. However, the Polish innovation system encompasses multiple and sometimes contradictory sets of R&I priorities and directions.</p> | <p>Systemic: The mechanisms of governance are going to be deeply reformed. The delivery of this complex revision of the whole R&D framework will be challenging in terms of avoiding discrepancies between policy concepts and their implementation and limiting overlaps between numerous support measures. Increased inter-ministerial coordination in some areas, e.g. electromobility is expected, as well as the announced intention of streamlining / prioritising the list of smart specialisations presented in the Strategy for Responsible Development.</p> |



3.2 Conclusions

The following table summarises the relationships between the clusters of countries classified on the basis of the type of innovation system (strongly developed, publicly led, in a developing state and lagging behind) and the key challenges in the governance (of innovation) systems, as reviewed from the European Semester and RIO review 2017.

The challenges of the national governance systems are qualified as “systemic”, when challenges concern with the overall structure of the system and “sectoral”, when only specific aspects of the governance system are under discussion.

Table 2: Relationship between types of national innovation systems and challenges of governance

| Clusters of EU countries (types of innovation systems) | Challenges for governance |
|--|---|
| Strongly Developed | |
| Austria | Sectoral: better evaluation of national strategy on innovation. |
| Belgium | Sectoral: better evaluation of national strategy on innovation. |
| Denmark | Sectoral: stronger relationship SMEs/universities and public research bodies. |
| Finland | Sectoral: limited cooperation among stakeholders (education area). |
| Germany | Sectoral: a clearer focus on implementation steps and evaluation. |
| The Netherlands | Sectoral: stronger strategic view in addressing the Grand Societal Challenges. |
| Slovenia | Systemic: coordination among the several R&I departments and weak stakeholders involvement. |
| Sweden | Sectoral: university and high education governance. |
| Publicly policy-led innovation systems | |
| France | Sectoral: improving coordination and consistency over the complex network of innovation publicly supporting structures. |
| Ireland | Sectoral: stronger relationship SMEs/universities and public research bodies. |
| Italy | Sectoral: stronger relationship SMEs/universities and public research bodies. |
| Latvia | Systemic: better coordination among fragmented and complex network of innovation supporting institutes. |
| Lithuania | Systemic: better coordination among fragmented and complex network of innovation supporting institutes. |
| Luxembourg | Sectoral: improving coordination between R&I actors. |
| Malta | Sectoral: ensuring the continuity of institutional knowledge, after the end of EU framework projects. |
| Portugal | Sectoral: university and high education governance |
| Developing innovation systems | |
| Bulgaria | Systemic: better coordination among fragmented and complex network of innovation supporting institutes; better evaluation. |



| Clusters of EU countries (types of innovation systems) | Challenges for governance |
|--|---|
| Croatia | Systemic: better coordination addressing the extreme fragmentation of innovation supporting institutes. |
| Cyprus | Systemic: long-term strategic vision and operativity of main bodies established to ensure governance of innovation. |
| Czech Republic | Systemic: better coordination among fragmented and complex network of innovation supporting institutes; better evaluation. |
| Hungary | Systemic: better coordination among fragmented and complex network of innovation supporting institutes. |
| Romania | Systemic: better coordination among national and regional bodies addressing innovation policies. |
| Slovakia | Systemic: better coordination among fragmented and complex network of innovation supporting institutes. |
| Spain | Sectoral: university and high education governance; improving coordination national/regional R&I policy. |
| Lagging behind innovation systems | |
| Estonia | Systemic: better coordination among national and regional bodies addressing innovation policies. |
| Greece | Systemic: local governance, better transparency and accountability. |
| Poland | Systemic: better coordination addressing overlapping of competences and lack of co-operation. |

Table 2 shows that there is a clear association between the types of national innovation systems and governance needs:

- the national innovation systems “strongly developed” need sectoral adjustments in governance, addressing specific areas whose characteristics depend on the specific features of innovation systems. For instance, in Belgium and Germany, characterised by a high devolution to federal regions, a smooth governance may need major coordination between national and regional levels, avoiding overlapping functions. In Finland and Sweden, characterised by national innovation systems strongly “industry oriented” (see I3U Deliverable 9.1) the governance of the education sector, i.e. provision of skilled work through university/industry collaboration, is crucial and under a strain. The only exception is Slovenia, classified among the strongly developed innovation systems, but whose governance system appears to suffer of systemic flaws, e.g. weak coordination and stakeholders’ involvement.
- the “publicly-led” national innovation systems also suffer in general of specific problems in the governance system, with the exception of Latvia and Lithuania, both affected by a pervasive endemic fragmentation of R&I competences and institutes. With reference to the other countries, traditional strong and developed publicly-led innovation systems in the field of innovation, e.g. France, may be not accompanied by the necessary smooth organisation, lacking coordination and efficiency.
- In the countries still in the “developing stage” of their national innovation systems, strongly dependent on external knowledge and competencies, the governance in general suffers of systemic problems: from weak coordination and fragmentation (Croatia, Bulgaria, Czech Republic, Slovakia, Romania and Hungary) to lack of strategic vision (Cyprus). Spain is the exception, for a better governance need basically only to address a closer cooperation in the education sector (university and industry), other than improving coordination among the several programmes and bodies to foster innovation.

- the characteristic of the innovation national systems in the countries “lagging behind”, characterised by a weak public policy, is conducive towards systemic governance problems, suffering of overlapping functions and lack of strategies.

It is worthwhile to stress that the tendency towards the fragmentation, i.e. the increasing involvement of a growing number of bodies and actors in innovation policy governance, is accompanied by different types of governance in advanced and laggard national innovation systems.

Though both types of governance can be considered as an answer to the growing complexity required by innovation policies, the results are different:

1. in the lagging and developing national innovation systems, the prevailing model of governance is characterised by major **centralisation of competences and bureaucracy**, resulting in problematic coordination and effective co-operation;
2. in the strongly developed and in some publicly led national innovation systems, the governance model paves for **major decentralisation** and efforts to **co-ordinate initiatives of different stakeholders** as to complement rather than contradict each other in fostering innovations. For example, in Austria and the Netherlands, two among the “strongly developed” national innovation systems, have seen similar developments, in which the integration of stakeholders in agenda setting and priority setting represents a vital mediating role in an otherwise fragmented system. As also stressed in literature (Edler, Fagerberg, 2017) “this is known to be challenging to achieve, as it tends to conflict with the established structures, practices, and routines in public administrations”.

In the next chapter, the picture of possible governance options dealing with innovation will be enriched by the opinions of experts and policy makers.

4. The governance of innovation policies in Europe: insights from interviews

14 interviews by phone have been conducted between May and August 2018 among experts of innovation policies in Europe (academia, researchers and policy makers), in order to elicit opinions on the implementation of the governance in the context of the Innovation Union strategy.

The list of experts interviewed and the dates of interviews are indicated in the following table.

| Expert | Qualification and Institution | Country | Day |
|-------------------------|--|---------|--------|
| 1. Andrzej Jasins | Prof. Faculty of Management, University of Warsaw | PL | 23 May |
| 2. Arkadiusz Kowalski | Prof Warsaw School of Economics-Department of Economic Research of East Asian States Institute of World Economy | PL | 24 May |
| 3. Christian Rammer | Senior researcher at ZEW's Department of Economics of Innovation and Industrial Dynamics | DE | 14 May |
| 4. Luc Soete | Rector Magnificus and professor of International Economic Relations at the School of Business and Economics, Maastricht University | NL | 29 May |
| 5. Magnus Gulbrandsen | Prof. TIK Centre for Technology, Innovation and Culture Faculty of Social Sciences | NO | 4 Aug |
| 6. Mario Pianta (*) | Prof. Political Economy, University of Urbino | IT | 14 May |
| 7. Mikel Irujo Amezaga | Delegation of the Government of Navarre to the EU | ES | 6 Aug |
| 8. René Wintjes | Senior Researcher, Coordinator Research Programme: Innovation Systems Indicators & Policy | NL | 17 May |
| 9. Rumen Dobrinsky | Director of Strategy and European projects, European Alliance for Innovation (EAI) | AT | 14 May |
| 10. Slavo Radosevic | Prof. Professor of Industry and Innovation Studies - School of Slavonic and East European Studies, University UCL | UK | 17 May |
| 11. Sonja Radas | PhD - Ekonomski institut, The Institute of Economics Zagreb | HR | 21 May |
| 12. Subramaniam Sumathi | European Commission, DG Education and Culture | B | 16 May |
| 13. Valentina Pinna | DG Research, Innovation & Health Lombardy Region Delegation to the EU | IT | 31 May |
| 14. Werner Bönnte | Prof. Dr. University of Wuppertal - Industrial Economics and Innovation Processes Schumpeter School of Business and Economics (DE) | DE | 15 May |

(*) Instead of interview, the expert has sent relevant documentation.

Given the small number of interviewees, the opinions collected should be considered just as a complimentary source of information in the direction of validation/verification of the governance of

innovation in Europe. The interviews have been conducted following a common template (Figure II), which is composed by four questions addressing different aspects of the governance of innovation in Europe. The answers to the questions have been treated anonymously and aggregated in order to find out common patterns.

In any case, the respondents are not individually responsible for the conclusions shown in the next paragraphs, which must be considered as solely an interpretation by the I3U consortium.

Figure II: Template for the interview

1) Subsidiarity principle:

Could you mention priorities where the EU innovation policies should primarily focus on?

Check the following policies:

- Direct financial support for the actors under various forms;
- State aid and tax policy;
- Public procurement;
- Regulation framework;
- Definition of standards;
- Intellectual property rights (IPR);
- Partnerships and coordination initiatives; and
- Culture of innovation.

2) Empowering EU agencies:

Do you think institutional competences are too fragmented among the EU actors dealing with innovation?

3) Co-ordinating the different levels of governance in Europe:

Could you mention specific areas where the coordination between Member States and the EU innovation policy could be established or improved?

E.g. financial services, competition, etc.? The establishment of additional institutional bodies or new organizational procedures could improve the coordination between Member States and the EU innovation policy?

4) Monitoring and evaluation:

Should the impact assessment of EU innovation policies be improved?

Could you suggest possible improvements or steps forward? E.g. new EU indicators and tools for monitoring performances, etc.

The next sections show the answers of the experts to the questions, classified by main topics.

4.1 Subsidiarity principle: could you mention priorities where the EU innovation policies should primarily focus on?

Introduction to the topic

The following table shows the current competences of the EU in various innovation policies.

Table 3: Competences of the EU for each of the components of the EU innovation policy mix

| Key policies | Fund | Regulate | Promote |
|-------------------------------|------|----------|---------|
| R&D policy | ✓✓ | ✓ | ✓✓ |
| Industrial and SME policy | ✓ | ✓ | ✓ |
| Education and skills policy | | | ✓✓ |
| Regional and cohesion policy | ✓✓ | | ✓✓ |
| Key framework conditions | Fund | Regulate | Promote |
| Financial support | ✓✓ | ✓ | ✓ |
| State aid and tax policy | | ✓ | ✓✓ |
| Public procurement | ✓ | ✓ | ✓✓ |
| Single Market and Competition | | ✓✓✓ | ✓ |
| Regulation framework | | ✓ | ✓✓ |
| Standards | | ✓ | ✓✓ |
| IPR | | ✓✓✓ | ✓ |
| Partnerships and initiatives | ✓✓ | ✓ | ✓✓ |
| Culture of innovation | | | ✓ |

Source: Raillon (2016) ✓: Potential action or low competence ✓✓: Important feature ✓✓✓: Strong competence

It can be seen that the strong importance in terms of power to regulate is confined to the completion of the internal EU market and EU Intellectual Property Right. For the rest, an important role of promotion and support concerns with most of the innovation policies, from regulation framework to financial support, with a low competence on education and industrial policy.

Emerging issues from the interviews

The discussion on the criteria to guide the allocation of responsibilities between EU and national/local level may benefit from the identification of **two extremes**: 1) innovation policies involving **cross-border issues** (e.g. single market completion, regulatory rules, market completion, harmonisation of standard, IPR, etc), in which the EU level should be preferably involved and 2) innovation policies addressing the **specific characteristics of national/regional context**, e.g. State-aid rules, taxation, Public Procurement etc; for which the involvement of the national level should be primarily ensured, for national governments could better identify local actors and strategies to spur innovation.

However, in such a context, criteria underlying the application of the subsidiarity principle should



take into account the **innovation divide**, i.e. the territorial gap separating European regions according to whether or not they are able to benefit from innovation. In general, western and northern European countries are stronger on the **innovation generation side**, due to major investment in R&D (in particular from the private actors), while Eastern countries need support in the **diffusion of innovation**. Therefore, a stronger intervention of EU in raising funding for R&D activities (e.g. direct financial support) for countries lagging behind would be welcome.

Concerning specific innovation policies, the **limited EU competences** of EU bodies for example with reference to **High Education policies**, may hinder innovation, given that education represents the foundation of Research & Innovation. Currently, the EU competences are limited to make recommendations, not having the power to influence the concrete uptake at national/local level.

Suggestions and insights towards the development of new EU competences have addressed the establishment of a developed **venture capital market**. It has been stressed that raising enough capital risk is an area in which the EU initiative is needed. Current examples in UK and Germany are not enough. At EU level fragmentation and small scale is still dominant. Last but not least, the completion of EU internal market for Services must be still fulfilled. The EU, compared for example to the US case, lacks of experience with regard to venture capital and valuable start-ups. Maybe the establishment of a European Stock Exchange (like the US NASDAQ) may help to develop a more sophisticated venture capital market industry and supporting raising funds for innovation.

Insights from the interviews

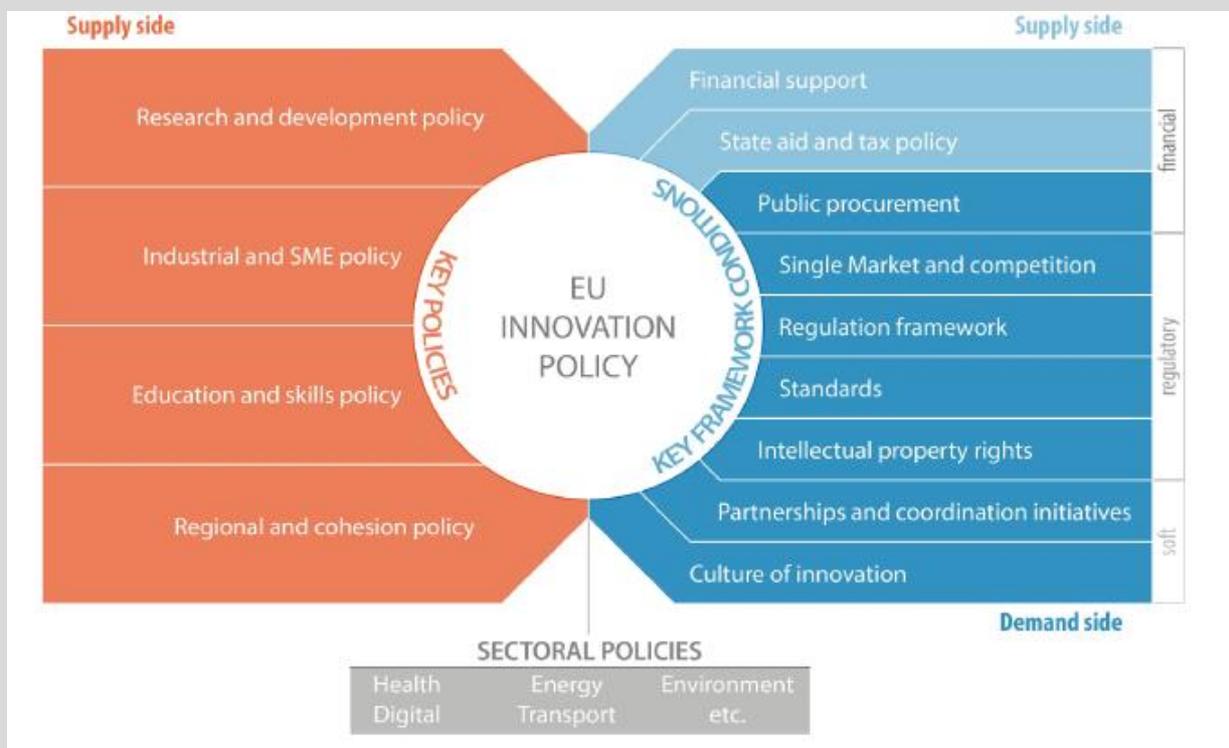
The following insights can be emphasised:

- The current allocation of responsibilities and competences to the EU bodies according to the subsidiarity principle **is basically right**. Cross-border issues (e.g. Intellectual Property Rights) and the definition of common general framework conditions (i.e. the completion of EU internal market) should be better allocated to EU competences. In principle, all activities generating **spill-over** to EU countries, for example, the definition of standards, should be left to EU competences.
- But a further shift of competences towards EU bodies should also address innovation policies that in principle should be left at national level (e.g. taxation). In particular, innovation policies dealing with the **EU innovation divide** should need a decisive EU intervention, i.e. supporting private investment in R&D through taxation policies and direct investments.
- In some cases, as for Education and labour skills policies, making recommendations at EU level may be not enough for MS and regions to reform the education system, raising the need to exert a more **stringent policy guidance**.

4.2 Empowering EU agencies: do you think institutional competences are too fragmented among the EU actors dealing with innovation?

Introduction to the topic

The figure below shows the complexity of EU innovation policy, which is the result of a long process starting from the 1960s, during which the concept of innovation is changed (see chapter 2 for details), as a consequence of policies supporting innovation progressively increased in complexity and objectives.



Source: Raillon (2016)

All that raises the issue of an excessive fragmentation of EU bodies and competences addressing innovation, leaving the room for finding the ways to major rationalisation.

Emerging issues from the interviews

Most of the interviewees acknowledge the **existence of excessive fragmentation** of EU competences and bodies dealing with innovation. Opinions differ about remedies and prescriptions, but roughly two "opposite camps" can be identified: those who may in principle and under specific conditions **accept the creation of new bodies** as a possible way out from fragmentation and those who considers the **creation of new bodies useless**.

Concerning the first line of thought, it can be said that the current organisation of EU tools and

instruments (e.g. innovation programmes, initiatives, etc.) supporting innovation policies is fragmented and something should be done. One possible area of intervention is **improving transparency**, e.g. making the users more able to get relevant information concerning innovation programmes and funding through one-stop shop contact points. In general, the combination of transparency and simplification should be pursued. In such a context, the set-up of new Agencies or bodies dealing with innovation may be considered. One important characteristics of this new Agency would be **reputation**, which should be gained in order to have credibility. It should not overlap and rather cooperate with existing bodies. Anyway, such a topic is challenging and even if in principle it cannot be dismissed, its implementation is deemed not to be one of easy application.

A new EU body specifically dedicated to improving **cooperation between East and West research institutes and industries** should be opportune, having the task to ease communication between different EU geographical areas and innovation systems. The topic of the new body should be **knowledge transfer** of experiences and best practices. Indeed, nowadays something more needs to be done in favouring Eastern-Western Europe cooperation. Because of preferential cultural linkages and common background in fact, cooperation for innovation mainly happens inside Eastern countries area.

On the opposite side, there is **scepticism about the establishment of new EU bodies** that should centralise competences and functions. This approach recognises indeed the stringent historical reasons behind the proliferation of competences and offices concerning innovation.

Furthermore, there are examples of **excellent coordination** among EU institutions in the field of basic research (e.g. the European Science Foundation) or the EIPs, which can be assumed as best practices at EU level of innovation catalysts and co-operation. Joint initiatives from EC DGs on common programmes, as in the Smart Specialisation Strategies, represent significant examples of the coordination of innovation policies at EU level.

According to this approach, more **learning among existing EU institutions** would overcome fragmentation, across the variety of innovation (policy) silo's; horizontal, systemic, multi-level, cross-disciplines, and across sectors (business innovation, technological, social innovation, eco-innovation, digital, public sector innovation, etc.).

Insights from the interviews

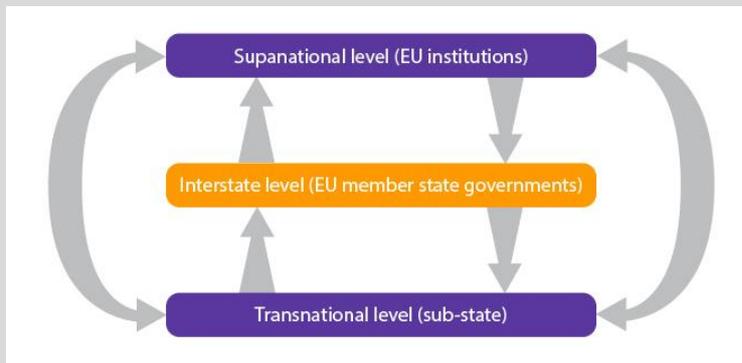
The following insights can be emphasised:

- The current allocation of competences among EU agencies **is acknowledged as inefficient, lacking of transparency**. But the same fragmentation among innovation policies competences and offices can in some cases also be found at MS level.
- However, the creation of new bodies may be not the solution. Rather, the solution may rely on **fostering the horizontal coordination among existing agencies**, e.g. through flexible horizontal structures cross-cutting across the DGs, engaging experts from different DGs in horizontal coordination activities.

4.3 Co-ordinating the different levels of governance in Europe: could you mention specific areas where the coordination between Member States and the EU innovation policy could be established or improved?

Introduction to the topic

The coordination strategy is necessary to support the European multi-level and multi-actor configuration of the innovation processes, in which each level has its own logic.



Source: European Studies <http://hum.port.ac.uk/europeanstudieshub/learning/module-4-theorising-the-european-union/multi-level-governance/>

As stressed in the European Commission Communication²¹, the multi-layer structure of innovation policies between European, national and regional level requires improved coordination, fostering synergies and better governance. “Indeed, the complexity of Community funding programmes adds to the multitude of schemes existing at national and regional level and makes access to relevant funding difficult. This calls for clear structures and substantial simplification of participation rules for all innovation funding, regardless of its origin”.

Emerging issues from the interviews

The interviewees’ opinions reflect in part the considerations spent with reference to the correct application of the subsidiarity principle, with particular reference to the distribution of competences between the EU and the national/regional levels. Most of the interviewees agree that a better coordination should stress the importance of **regional institutions**.

It is almost unanimously acknowledged that the improvement of the coordination between the different levels implementing innovation policies in Europe can be realized through the **effective governance** of the relationships between European regions and the EU. Regional bodies in Europe are more linked to national level than to the European one, as for example in Poland. A better coordination between Regional bodies at EU level would be needed. In such a context, it seems there is a **lack of effective reforms of National Innovation Systems** (particularly in the Eastern New

²¹ Reviewing Community innovation policy in a changing world, Commission of the European Communities, COM (2009) 442, 2 September 2009



Member States). The EU competences should better address the activities of National Regional bodies dealing with innovation. Something more than EU recommendations should be needed in terms of promoting effective policies for innovation at Member State level. All in all, the EU bodies should “keep an eye open” on regional reforms of national innovation systems, specifically in the direction of implementing concrete actions for ensuring better reforms.

An example of better coordination and distribution of responsibilities between European Regions and EU initiatives Coordinating can be reached in the field of Artificial Intelligence (AI). In such an important innovative field, the EU recommendations and the strategies at national level may be not in themselves sufficient, because they risk to be too generic. Rather, the regional/local level should act as the **operational level**, that can make the EU AI strategies more concrete. Regional authorities could play a role in mapping the strengths of the region within specific sub-areas of AI and put in place the necessary measures for these strengths to be best capitalised.

Innovation policies at EU level should be tailored to the different MS economic structure and situation. In particular, **all the components of the innovation-cycle should be addressed**. There is the tendency to concentrate EU funding in the R&D stage only, discarding countries that do not have research-intensive network but, for example, import-technology economic structure. For these countries EU innovation policies focused on R&D may be not useful. How to connect the different needs of EU countries concerning innovation stages? A **better coordination** of EU financial instruments, for example between innovation policies managed by **DG Research (R&D based) and DG REGIO** may be a positive step forward, making the EU financial instruments tailored to the different EU regions’ needs.

Insights from the interviews

The following insights can be emphasised:

- Innovation is strongly linked to spill-overs from agglomeration of capital and infrastructure. These assets are not present homogeneously across the EU countries and regions and the task of investing in innovation where these agglomerations are not present may lead to no appreciable results. Moving away from promoting the convergence towards ‘one-size-fits-all’ best practice, a **better coordination between EU financial instruments** may provide solutions tailored to different European Regions’ needs, addressing **all the components of the innovation-cycle**.
- Something more than EU recommendations should be needed in terms of promoting effective policies for innovation at Member State level. It is advisable that EU institutions elicit a **stronger political commitment** from MS to support innovation process on regional reforms of national innovation systems, specifically in the direction of implementing concrete actions for ensuring compliance with EU suggestions and recommendations.

4.4 Monitoring and evaluation: should the impact assessment of EU innovation policies be improved?

Introduction to the topic

The European Innovation Monitoring System (EIMS), the precursor of the European Innovation Scoreboard still operating to-day, was established in 1990 and provided innovation system stakeholders with information, analysis and research.

There is a tight relation between the European Commission governance of innovation and forms of co-regulation, that need to be accompanied by adequate monitoring and enforcement, in order to avoid being captured by information partially reported by incumbent players and to identify best practices.

Last but not least, innovation policies are open-ended and may lead to uncertain outcomes. Evaluation and regular monitoring of public policies serve to ensure feed-back into policy design.

Emerging issues from the interviews

The interviewees' opinions can be classified in two categories, basically focussing on the ontology of the monitoring and evaluation systems, i.e. which tasks and strategic objectives should they pursue, and on data issues, i.e. which data are needed and what are the relevant limitations.

With reference to the first category, it has been stressed that **impact evaluation** is an issue. For example, considering the impact assessment of EU funded programmes and projects: what is the outcome of the EU R&D projects? How and to which extent they have improved innovation? Impact assessment should not only concern the ex-post dimension (i.e. the results), it should also address the ex-ante dimension: how to monitor the project before its ending stage. Policy makers continuously ask questions about how resources have been spent and therefore **improving impact assessment of innovation policies** is a priority, also in the perspective of best practice identification and dissemination.

Other shortcomings from the current EU monitoring activities concern with the **scope** of the monitoring activity. The current EU monitoring activity is important; in particular, the mapping exercise with which it is possible to have an overview of how different European Regions behave with reference to investments, etc. This can help policy makers. However, we still miss a complete overview of what happens in different regional level concerning innovation. For example, indicators and data addressing the **social aspects of innovation** should also be considered in benchmarking and impact assessment: not just science and technology indicators. Not only firms, but also stakeholders in Public sector and civil society should be included in the impact assessment, e.g. surveys and indicators on innovation (policy) practices, etc.

Another aspect is that the evaluation and monitoring usually concerns single programmes on their own, taken separately from one another, and there is no **overall evaluation of the EU innovation**

policy mix taken as a whole, i.e. considering the overall effect of all programmes taken together on innovation activity and innovation outputs in the EU. This dimension should be improved.

Concerning data requirement, despite some improvements (the Innovation Scoreboard, at EU and Regional level), there is still much to do in the field of monitoring. Reinforcing international co-operation, for example involving OECD experts, as in the past, may improve the research of **new indicators for monitoring and assessment of innovation**. In particular, if we consider the monitoring of innovation performances, data at aggregated level could be used, but if we examine the innovation impact assessment, **micro-data** are needed, e.g. for the assessment of additionality of policies, or network additionality contribution to innovation. Unfortunately, **the access to micro-data at industry level is limited**. An important area to be monitored is the Smart Specialisation Strategy: in Europe, regions perform different patterns to innovation and we lack criteria for a harmonised monitoring framework.

Insights from the interviews

The following insights can be emphasised:

- The current monitoring approach (e.g. the European Innovation Scoreboard) reflects needs and characteristics of the **R&D stage of innovation**. It was created to mirror the US experience, but it seems not to be tailored to the different EU countries needs in term of **take up of innovation processes and products**. For example, major efforts in monitoring the national Smart Specialisation Strategies could improve the knowledge base on innovation at regional level.
- Policy makers continuously ask questions about how resources have been spent and therefore **improving the impact assessment of innovation policies** (in particular, evaluation of package of policies) is a priority, also in the perspective of best practice identification and dissemination.
- Concerning data, there is lack of data and indicators for understanding **how to improve STEM (science, technology, engineering and mathematics) competences** along all the life-cycle: from schools to higher education and beyond. In particular, there is untapped potential in ICT and engineering where **women and minority groups and disadvantaged are under-represented**.
- Furthermore, focus on metrics and data should be put on how **to monitor and improve entrepreneurship**. The current evaluations do not allow to compare MS performances in entrepreneurship, not just following R&D patterns of big firms. New indicators and data would be needed at this purpose.

5. Conclusion: towards a new pro-innovation governance framework?

The evolution of the governance of innovation policies and strategies emerging from the recommendations and initiatives of EU institutions over the past 60 years has been influenced by the different conceptual interpretations of innovation. As shown in Chapter 2, to the extent that the concept of innovation has progressively been moving towards major complexity (in actors involved and policies), which is the ongoing dominant trend²², a **better coordination overcoming fragmentation** has gained the status of a priority. Namely:

1. better coordination and balance between the different EU bodies, avoiding overlapping of competences among EU institutions dealing with innovation;
2. better coordination of innovation policies at sectoral level, reaching an overall coherence;
3. better coordination between different governance levels (EU, national and regional) i.e. efficient application of the subsidiarity principle.

At MS level (chapter 3), the analysis of the governance practices carried out in the light of the recent assessment on national innovation systems²³ has pointed out that there is a clear association between the types of national innovation systems identified in the I3U Deliverables 9.1-9.3 and governance needs:

- the national innovation systems “strongly developed” need sectoral adjustments in governance, addressing specific areas whose characteristics depend on the specific features of innovation systems;
- the “publicly-led” national innovation systems also suffer in general of specific problems in the governance system;
- the national innovation systems still in the “developing stage” and even more those “lagging behind”, incur in structural governance shortcomings, e.g. weak stakeholders’ involvement, lack of evaluation and co-ordination, etc.;

It is worthwhile to stress that the tendency towards the fragmentation, i.e. the increasing involvement of a growing number of bodies and actors in charge for innovation policy, is accompanied by different types of governance in the advanced and laggard national innovation systems.

Though both types of governance can be considered as an answer to the growing complexity required by innovation policies, the results are different:

1. in the lagging and developing national innovation systems, the prevailing model of governance is characterised by major **centralisation of competences and bureaucracy**, resulting in problematic coordination and effective co-operation;

²² The concept of “open Innovation”, still operating in the last decade entails a broad view of innovation, in which the actors of the innovation processes are described as “porous structures exchanging funds, knowledge, ideas and skills” (Reillon, 2016)

²³ The 2017 RIO Observatory and European Semester



3. in the strongly developed and in some publicly led national innovation systems, the governance model paves for **major decentralisation** and efforts to **co-ordinate initiatives of different stakeholders** as to complement rather than contradict each other in fostering innovations. For example, in Austria and the Netherland, two among the “strongly developed” national innovation systems, have seen similar developments, in which the integration of stakeholders in agenda setting and priority setting represents a vital mediating role in an otherwise fragmented system. As also stressed in literature (Edler, Fagerberg, 2017) “this is known to be challenging to achieve, as it tends to conflict with the established structures, practices, and routines in public administrations”.

Insights from interviews with experts of innovation polices in Europe (chapter 4), despite the small sample of interviewees, have contributed to shed lights on the following important criteria for a pro-innovation governance:

1) Subsidiarity principle and balance of competences between EU institutions and MS.

- The current allocation of responsibilities and competences to the EU bodies according to the subsidiarity principle **is basically right**. Cross-border issues (e.g. Intellectual Property Rights) and the definition of common general framework conditions (i.e. the completion of EU internal market) should be better allocated to EU competences. In principle, all activities generating **spill-over** to EU countries, for example, the definition of standards, should be left to EU competences.
- But a further shift of competences towards EU bodies should also address innovation policies that in principle should be left at national level (e.g. taxation). In particular, innovation policies dealing with the **EU innovation divide** should need a decisive EU intervention, i.e. supporting private investment in R&D through taxation policies and direct investments.
- In some cases, as for Education and labour skills policies, making recommendations at EU level may be not enough for MS and regions to reform the education system, raising the need to exert a more **stringent policy guidance**.

2) Empowering EU agencies through better organisation or the establishing of new bodies.

- The current allocation of competences among EU agencies **is acknowledged as inefficient, lacking of transparency**. But the same fragmentation among innovation policies competences and offices can in some cases also be found at MS level.
- However, the creation of new bodies may be not the solution. Rather, the solution may rely on **fostering the horizontal coordination among existing agencies**, e.g. through flexible horizontal structures cross-cutting across the DGs, engaging experts from different DGs in horizontal coordination activities.

3) Co-ordination of MS and EU innovation policies

- Innovation is strongly linked to spill-overs from agglomeration of capital and infrastructure. These assets are not present homogenously across the EU countries and regions and the task of investing in innovation where these agglomerations are not present may lead to no appreciable results. Moving away from promoting the convergence towards ‘one-size-fits-all’ best practice, a **better coordination between EU financial instruments** may provide solutions tailored to different European Regions’ needs, addressing **all the components of the innovation-cycle**.
- Something more than EU recommendations should be needed in terms of promoting effective

policies for innovation at Member State level. It is advisable that EU institutions elicit a **stronger political commitment** from MS to support innovation process on regional reforms of national innovation systems, specifically in the direction of implementing concrete actions for ensuring compliance with EU suggestions and recommendations.

4) Monitoring and evaluation key challenges.

- The current monitoring approach (e.g. the European Innovation Scoreboard) reflects needs and characteristics of the **R&D stage of innovation**. It was created to mirror the US experience, but it seems not to be tailored to the different EU countries needs in term of **take up of innovation processes and products**. For example, major efforts in monitoring the national Smart Specialisation Strategies could improve the knowledge base on innovation at regional level.
- Policy makers continuously ask questions about how resources have been spent and therefore **improving the impact assessment of innovation policies** (in particular, evaluation of package of policies) is a priority, also in the perspective of best practice identification and dissemination.
- Concerning data, there is lack of data and indicators for understanding **how to improve STEM (science, technology, engineering and mathematics) competences** along all the life-cycle: from schools to higher education and beyond. In particular, there is untapped potential in ICT and engineering where **women and minority groups and disadvantaged are under-represented**.
- Furthermore, focus on metrics and data should be put on how to monitor and improve entrepreneurship. The current evaluations do not allow to compare MS performances in entrepreneurship, not just following R&D patterns of big firms. New indicators and data would be needed at this purpose.

All in all, which would be the most important characteristics of a pro-innovation governance system?

It is likely that the possibility of an overall better governance of innovation in Europe basically relies on the **relationships between the EU level and the national/regional levels**. The fair implementation of the principle of subsidiarity, implying the redefinition of EU competences in the context of the EU innovation divide and the intrinsic diversity of regional innovation patterns, are among the challenging topics at stake.

As recognised by most of the experts interviewed, a promising paradigm for a new framework of governance addressing EU innovation and national/regional development is the Smart Specialization Strategy (RIS3)²⁴. This innovation policy, an instrument of the Cohesion Policy, is deemed to play an important role in shaping a new framework for the governance of innovation, basically due to the following characteristics²⁵:

- **Integration in National Innovation Policies**. Some regions and Member States implement the RIS3 with national support measures outside their Operational Programmes. Also, RIS3 includes elements of R&I policy, but these are implemented, harmonised and integrated into national/regional R&I policies.
- **Capability to take into account of the different economic and social patterns of the**

²⁴ <http://s3platform.jrc.ec.europa.eu/home>

²⁵ For a comprehensive overview of role, potentials and limitations of the Smart Specialisation Strategy, see Foray, Morgan, Radosevic (2018)



European regions. The strategy of the promotion of innovation value chains at EU level and beyond²⁶ allows the European regions to establish inter-regional innovation value chains with a view to aligning regional specialisations and capabilities to expedite technology deployment.

- **New type of governance of innovation.** As stressed by Foray, Morgan, Radosevic (2018), “this policy is neither purely bottom-up (because at some point, priorities are chosen by the government) nor totally top-down (because the way priorities are identified and developed in the entrepreneurial discovery process introduces a strong bottom-up component). Rather, it can be defined as an **intermediate process which aims to enhance entrepreneurial coordination within a framework structured by the government**”.

Generalising the lessons drawn from RIS3, it can be said that the resulting framework of a potential pro-innovation governance should combine a bottom-up component, i.e. the flexibility according to which each national innovation system defines priorities and national reforms, involving regional and local stakeholders, with a top-down approach from EU bodies, which should ensure compliance with the commitments of national innovation reforms and an overall EU coherence, e.g. addressing Grand Societal Challenges (GSCs).

²⁶ See the RIS3 initiatives Vanguard3 or INNOSUP4 for details. Innovation value chains benefit of the extraterritorial linkages to enhance a region/ country's position in global or regional value chains. In such a way, each different regional capability, despite its level of development, could play a role in innovative value chains.

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