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Towards System Oriented Innovation Policy Evaluation?

Evidence from EU28 Member States

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Highlights

- Most national innovation policy evaluation practices are still not truly 'systemic'.
- Only 6 out of EU28 countries have developed a system oriented innovation policy evaluation.
- 13 countries have some traits of it; whereas 9 countries have no real evaluation practices.
- It is urgent to build capacity in the EU28 for system oriented innovation policy evaluation
- It is the cornerstone for evidence-based and distributed intelligence in innovation policy-making

Abstract:

Many years after the introduction of the innovation system concept in innovation policy design, it is still not clear whether innovation policy evaluation practices follow a system approach. Building on evaluation and innovation studies, this article develops the concept 'system oriented innovation policy evaluation' based on four attributes (coverage, perspective, temporality and sources). The attributes are used as analytical devices for gathering extensive empirical evidence on the actual practices of EU28 member states. The findings show that few countries have developed a type of innovation policy evaluation that is system oriented. The advent of a system approach to innovation policy evaluation offers the opportunity of comprehensive, contextualized and evidence-based innovation policy-making. However, there are still serious obstacles as such an approach requires important knowledge and organisational capacities. Overcoming these obstacles would need more decided evaluation capacity-building at the national level.

Keywords: Evaluation, innovation policy, innovation system, innovation indicators, evidence-based policy, European Union, holistic.

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1. Introduction

During the past decades there has been an increasing focus on the need to provide innovation policy-makers with more comprehensive and knowledge-based tools for policy-making. The complexity of innovation systems and the recent developments in new policy initiatives require more sophisticated intelligence and knowledge, as key sources for policy learning. Further improvements in science and technology foresight, technology assessment and, innovation policy evaluation have been largely seen as key areas for strong, comprehensive and strategic policy learning (Kuhlmann et al., 1999). This paper focuses on one of these, namely, innovation policy evaluation. In particular, the paper aims at examining the extent to which countries have introduced system oriented innovation policy evaluation practices, and if so, what characterises them.

Policy-makers seem to have embraced the notion of innovation system when defining innovation policy interventions (Kuhlmann et al., 2010). However, it is still unclear the extent to which innovation policy evaluation practices have also embraced the system oriented-perspective. As we will review in the next section, most scholarly publications have addressed this matter from a normative perspective, suggesting specific models for how policy-makers and evaluators could go about it. Some of these normative models suggest the integration of different innovation policy evaluations to obtain a coherent overview (Edler et al., 2008) (Magro and Wilson, 2013). Others put more emphasis on integrating the results of policy evaluations with insights about specific problems and bottlenecks in the innovation system (Arnold, 2004) (Jordan et al., 2008) (Hage et al., 2007).

In spite of the relevance of these normative models for how to conduct the evaluation, we still do not have empirical studies substantiating whether or not European countries are in fact organizing and conducting system approach innovation policy evaluations, and if so, what characterizes them. In other words, we still lack empirical evidence about current practices across different countries (Martin et al., 2012). Building on the above-mentioned scholarly approaches, this article develops the concept 'system oriented innovation policy evaluation'. We define it as the regular and knowledge-based set of practices that evaluates the effects of innovation policy within the innovation system.

The key attributes that constitute the concept 'system oriented innovation policy evaluation' are used as analytical dimensions to gather and characterize empirical evidence about the actual evaluation practices of EU's 28 member states. Hence, the leading research question of this paper is: How far, and if so how, are EU 28 member states developing system oriented innovation policy evaluations?

The paper proceeds as follows. After reviewing the literature on this topic in section 2, section 3 builds from there and provides a clear-cut definition of system oriented innovation policy evaluation based on four attributes. Those attributes are operationalized in order to undertake an orderly empirical analysis, and the data sources and some important methodological considerations of the analysis are reflected upon. Sections 4 and 5 present the analysis, first looking at how the EU28 countries perform in terms of each of the four attributes (section 4), and thereafter looking at a four-fold typology characterizing each of the 28 EU countries. The conclusions summarize the findings, pointing out cross-national diversity and discussing further research.

2. Models in the Literature

During the past two decades the innovation system approach has gained substantial endorsement among scholars and policy-makers alike. This approach sees innovation as a complex social process of a cumulative nature, embedded in complex institutional and organizational national contexts (Lundvall, 1992) (Nelson, 1993) (Edquist, 2005). It brings forward the notion of innovation as the outcome of complex interactions and dynamics in the idiosyncratic socio-economic context of an economy. Yet, the more the innovation system approach has gained the upper hand, the more apparent have the limitations of the current innovation policy evaluations become.

With its focus on interaction and interactive learning, the system approach of innovation policies requires more sophisticated tools to enable policy-makers to better grasp the system-wide impact of innovation policy instruments and mixes (Smits and Kuhlmann, 2004). In his seminal paper about the new frontiers of evaluation studies, Irwin Feller (2007) reflected upon this need for more encompassing approaches stemming from the innovation system approach on the one hand;

and the conventional praxis of research evaluation of individual R&D programs on the other. Single evaluations are increasingly perceived to be too limited to provide answers regarding the impacts of public initiatives in the wide framework of the economy. “Existing evaluations touch only lightly, however, on how the strategies, behavior, performance of the sectors or actors described in the national innovation taxonomy change as a result of the cumulative, long term impact of a cluster of programs” (Feller, 2007).

Likewise, in their review of the literature Molas-Gallart and Davis argue that “the practice of policy evaluation continues to lag behind advances in innovation theory. Innovation theory has produced successive generations of more sophisticated conceptual models that seek to explain how the relationship between scientific and technological research and the market opportunities for innovation occurs.” (Molas-Gallart and Davies, 2006). Nevertheless, these authors argue, much of the evaluation undertaken today is still performed at the project and program level, and is mainly based on simple models of impact assessment and accountability. Yet, they underline that it is not an easy task to aggregate and integrate findings relating to specific policies and programs into an overarching framework that evaluates the effects of policies within the national innovation systems. The innovation system approach and the theoretical framework it implies “have proved difficult to use in the practice of evaluation, resulting in a gap between evaluation practice and Science Technology Innovation (STI) policy theory” (Molas-Gallart and Davies, 2006).

In response to the need of evaluation to move beyond the myriad of isolated individual program-focused evaluations, a few models have suggested different ways to guide policy-makers’ and evaluators’ practices. In the earliest work on this theme, Arnold (2004) suggests how to develop research and innovation policy evaluation in an innovation systems’ world. He proposes an approach to evaluation that considers “to a greater extent the interplay of these tools with their environments” (p.2). His model combines three levels: the traditional program evaluation, whose scope needs to be expanded to aim at identifying regularities across programs through meta-evaluations; the evaluation of the health of the innovation system based on a series of system-wide dimensions (such as the innovativeness of the business sector, adequacy and provision of infrastructures, the regulatory framework conditions for innovation, etc); and sub-systems evaluations, which target specific possible bottlenecks at a meso-level (policy mixes, or institutions performance). (Arnold 2004).

A similar multi-level model is proposed by Jordan and Hage. Mainly focusing on developing an epistemological and indicator-based model within which to integrate specific innovation policy instruments' evaluations, these authors distinguish between the micro-, meso-levels (Jordan et al., 2008), and macro-level (Hage et al., 2007). Building on Arnold, the authors aim at outlining "a theories-based innovation systems framework (ISF) of indicators for RTD evaluations that can aid government policy makers in policy formulation and reformulation. The indicators that are proposed suggest protocols for performance monitoring and evaluation" integrating innovation policy instruments and mixes' evaluations herein (Jordan et al., 2008) (p. 118).

Other approaches focus instead on the nature of the assessment data and material upon which the evaluation is currently based. In this sense, Edler et al (2008) suggest "using existing evaluations to learn about policy performance and policy effects on the system level". Inside this frame they separate two concepts, namely, evaluation synthesis and meta-analysis, both of which serve as the basis for an overall framework for utilizing and analyzing existing evaluation data. Evaluation synthesis is understood as "an aggregated content analysis based on multiple evaluation reports on similar programs or projects" (Edler et al 2008). For its part, meta-analysis allows for "an improved comparison and understanding of interventions and their effects by taking into account the results of a large number of evaluations" (Edler et al 2008). Hence, whereas the former aggregates and synthesizes existing evidence, the latter provides the basis for contextualizing such evidence in a broader context, allowing for more strategic insight and overview.

A somehow similar approach has been suggested by Magro and Wilson (2013), who focus on "meta-evaluations or secondary analyses that build on individual evaluations in trying to capture the system oriented nature of policies; moving ahead from isolated, individual evaluations". In that respect, they share a common viewpoint with Edler et al (2008) focusing on the policy space, or, more concretely, on "the innovation policy system as the conjuncture of policy mix and multi-level dimensions" (p. 1647). They use this model in one case study, conducting an evaluation mix of the Basque Country innovation policy. The starting point of their model is the identification of individual policy rationales and their corresponding instruments. Hence, the evaluation mix protocol that they suggest is the practical articulation of how to conduct this evaluation in a way

that brings together the focus of policy mixes with the recent calls for more system oriented approaches to innovation policy evaluation.

From the above we can see two main approaches. The first approach, by Arnold and Jordan-Hage, takes the starting point in the innovation system, and strives to identify specific indicators and contents that act as the framework within which to integrate the evaluation of specific innovation policy instruments and mixes. The second approach by Edler et al. and Magro & Wilson begins with pre-existing innovation policy evaluations and suggests active efforts and means to generate synthesis and meta-analysis from them, integrating them in order to create a comprehensive system oriented innovation policy evaluation.

3. Investigating the practices of 'System Oriented Innovation Policy Evaluation'

3.1 Definition and Operationalization

However useful the normative models reviewed in the previous section, there is still a need to develop an analytical framework for studying empirically the current country-level practices. More concretely we need to define the concept of 'system oriented innovation policy evaluation' in a way that allows for an empirical analysis of EU28 countries practices. We need to be able to identify clearly whether or not a concrete country has developed a system oriented innovation policy evaluation. A clear definition and its operationalization will allow us to grasp the complexity of the empirical reality, while avoiding the classical problem in the social sciences of 'concept stretching' (Sartori, 1970). Likewise, a clear concept is important for clarifying the specific attributes that define it, and for highlighting the analytical dimensions required to undertake empirical studies and to characterize the diversity of empirical practices.

We see system oriented innovation policy evaluation as a fundamental tool for creating strong, comprehensive and strategic policy advice. Its purpose is to provide an overall, critical and strategic overview of the performance of innovation policies in the context of the performance (and problems) of the innovation system. To be sure, "evaluations are used to inform policy-

makers, program managers and other stakeholders about the effectiveness, efficiency, appropriateness and impact of policy interventions" (Edler et al., 2008) p. 175. Following from all this, we define 'system oriented innovation policy evaluation' as: the regular and knowledge-based set of practices that evaluates the effects of innovation policy within the innovation system. It is important to remind the readers that analytical concepts in the social sciences are constituted by attributes (Sartori, 1970) (Goertz, 2006), which are essential analytical elements in comparative studies and in theory-building exercises (Collier et al., 2008). Thus, we distinguish four constitutive attributes in system oriented innovation policy evaluations: a wide coverage of evaluation elements, a systemic perspective assessing innovation policy performance and innovation system performance, a high regularity of evaluation practices, and a diversity of expertise. The selection, definition and operationalization of these four attributes are explained below.

Our definition of system oriented innovation policy evaluation can be seen as an 'ideal type': a notion that defines the general traits of the expected phenomena, and which is used for analytical purposes (Goertz, 2006). Ideal models are formed deductively from theorizing endeavors and aim at providing clear guidance for empirical analysis (Swedberg, 2012) . However, because they are 'ideal' they might not be found in their 'purity' or 'entirety' in the real world. They are abstractions, and may not necessarily to be found 100% replicated in the empirical complexity of social phenomena.

For this reason, we rarely expect to find countries carrying out ideal types of system oriented innovation policy evaluation, because it is very demanding given the complexity of the task. Instead, in our empirical analysis we expect to find only few countries which are conducting 'system oriented policy innovation evaluation' or complying in an assertive manner with the four attributes that define our ideal model (see Table 1 below).

The first attribute, **coverage**, refers to the extent to which the most important elements (areas) of evaluation are included. This attribute refers to the contents of what is being actually evaluated. This attribute is inspired by earlier treatments in the literature that consider how extensive the object of evaluation actually is (Dahler-Larsen, 2012). In our study, we operationalize 'coverage' into three elements, namely, the evaluation of innovation policy instruments, of innovation policy mixes, and of socio-economic performance assessment.

By policy instrument evaluation we understand evaluation practices whose focus is to assess the impact of one particular innovation policy programme, for example, the impact of an R&D program or of a tax incentive scheme.

Policy mix evaluations are the assessments of more than one policy instrument at once, and take into consideration their joint impact (additionality and complementarity). Policy-mixes have been considered of fundamental importance in understanding the performance of innovation policies (Flanagan et al., 2011) (Cunningham et al., 2016) and thus are highly relevant in the context of system oriented innovation policy evaluation.

Socio-economic performance assessments refer to the appraisal of the innovation system as a whole. These assessments use input indicators (such as employment in knowledge-intensive activities), and output indicators (such as high-tech exports). They often discuss analytically the possible factors behind such indicators. There is a wide variety of approaches to this kind of assessment, carried out with varying degrees of sophistication, ranging from simple reporting of indicators to far more sophisticated large-scale innovation performance assessments. It is important to note that merely collecting and publishing statistical data does not amount to a socio-economic performance assessment. Instead the 'raw' data has to be appraised in the national context to be considered a proper assessment.

The second attribute in our definition of system oriented innovation policy evaluations has to do with its **systemic perspective**. This attribute is important for theoretical reasons. Theory holds that national systems of innovation are based on two dimensions, namely, the institutional set-up (formal and informal rules of the game and framework conditions – here including innovation policy) and the socio-economic dimension (the production sector that performs innovation) (Lundvall, 1992). For this reason, countries with system oriented innovation policy would invariably include a perspective that assesses both dimensions. This attribute is important for our definition because the purpose of system oriented innovation policy evaluation is to provide an overall and strategic overview of the performance of innovation policies in the context of the performance (and problems) of the innovation system. This takes place typically in the form of what Edler et al have conceptualized as 'meta-analysis', which provides the basis of contextualizing the evidence of various innovation policy evaluations in the context of the performance of the innovation system (Edler et al., 2008).

In order to operationalize the empirical analysis of whether a country has or not such a systemic perspective, we look into whether that country has produced reports with a systemic perspective of the performance of innovation policies in the context of the performance (and problems) of the innovation system. Examples of these include (but are not limited to) the OECD reviews of innovation policy and country reviews by the European Commission Policy Support Facility. Thereafter we assess to what extent these reports include an extensive analysis of both dimensions, or only a limited analysis.

The third attribute that defines 'system oriented innovation policy evaluations' is **temporality**, namely, the extent to which there is a certain level of regularity in the evaluation of the three coverage elements (policy instruments, policy mix and socio-economic performance) and of the reports with systemic perspective. This attribute is part of our definition of system oriented innovation policy evaluation because the time-dimension of evaluation practices is a fundamental aspect for an on-going strategic overview. Furthermore, temporality is a dimension that has previously been included in evaluation studies, as a fundamental aspect of countries' different approaches to evaluation practices (Dahler-Larsen, 2012). In this article we operationalize temporality by looking at whether countries have conducted evaluations on a regular basis or not. Admittedly, different types of evaluations might have a different temporality – for example, reports that look at systemic perspective are often undertaken in relation to particular strategic events, such as in anticipation or after major policy overhauls; whereas, socio-economic performance assessments might take place regularly every year. All in all, temporality is an important attribute, because evidence-based policy-making requires not only that different parts of innovation policy are evaluated, but also that the body of assessments is regularly updated.

Finally, the fourth constitutive attribute of 'system oriented innovation policy evaluation' refers to the **expertise** of the evaluations, namely, the different expertise involved when conducting different evaluation elements. Our definition emphasizes the knowledge-based nature of evaluation practices, which is a widespread view in the evaluation literature. This fourth attribute is an essential part of the concept because it is related to the formative dimension of evaluation in public policy contexts (rather than the summative dimension of evaluation). The theoretical assumption is that the broader the basis of knowledge-base, the broader the formative dimension of the evaluation practice. Formative evaluation of public policy emphasizes learning as the

ultimate goal of evaluation. Therefore, it needs a broad basis of knowledge and expertise in order to better understand how policies achieve their effects (Sanderson, 2002).

In our operationalization we examine whether countries use diverse knowledge ahd expertise in evaluation, in particular, if they combine national and international expertise (conducted by international organisations such as OECD, EU, World Bank), as well as internal (conducted by governmental units) and external expertise (by private consultancies, universities, think-tanks, etc.). Recent studies about practices of instrument-level evaluation look at this (Edler et al., 2012); in addition, the theory of absorptive capacity stresses the importance of combining internal and external dimensions in organizational capabilities (Borrás, 2011). In the context of our conceptualization of 'system oriented innovation policy evaluations' this attribute is particularly relevant because of the widespread competences needed to conduct the different elements of evaluations and to deal with the complexity of establishing a meaningful overview.

Table 1: The four attributes defining the concept "system oriented innovation policy evaluation", their operationalization and measurement.

Definition of the attributes	**Operationalization for empirical analysis**	**Measurement[1] scores**
Coverage: The extent to which the evaluation covers three most important elements (see the cell to the right)	We examine whether countries are conducting evaluations of the following three elements: - Innovation policy Instruments - Innovation policy mixes - Socio-economic	Value 2: when there is a substantial number and sophisticated forms of evaluations Value 1: fewer numbers of evaluations and less sophisticated Value 0: very few or none of the above

[1] *See section 3.2 on data and methodology, and Section 4 for more detailed operationalization of measurement.

	performance	
Systemic perspective : The extent to which countries analyze the systemic perspective between innovation policy performance and innovation system performance	We examine whether or not countries have produced reports with systemic perspective.	Value 2: The reports include an extensive analysis of the systemic perspective. Value 1: The reports only include a limitedanalysis of the systemic perspective. Value 0: no reports.
Temporality: The extent of regularity in the evaluation in all the three coverage elements	We examine whether countries have conducted evaluations on a regular basis	Value 2: evaluations are conducted with a high level of regularity Value 1: some evaluations are conducted regularly, but others more sporadically Value 0: evaluations are done sporadically and ad-hoc
Expertise: The extent to which different expertise is involved in conducting evaluation of the three elements above	We examine whether countries use diversified expertise on evaluation, particularly the combination of national and international, internal (ministerial/public) and external (private consultancies, universities, think-tanks, etc) expertise.	Value 2: when a country has a strong combination of national/international evaluations that are either internal/external to the government Value 1: when a country has significant record of only two of the above Value 0: when a country has only one or none of the above

3.2 The Data and Methodology

Data about the system oriented innovation policy evaluation practices in EU countries are not easily accessible. For this reason the research strategy of the present study has been to use a sequential research design to collect different types of data as a means of obtaining solid empirical evidence. Firstly, we have conducted a total of 62 semi-structured interviews in all EU28 countries: 52 with high-ranked government experts, and 10 with academic/independent researchers. The interviews were conducted between January 2016 and June 2017, with at least 2 interviews per EU28 country (see Annex 1). They were based on a guideline with specific semi-structured questions related to the items conceptualized above. Open room for discussion allowed gathering additional relevant information. The second set of data used in this study was gathered from a number of directly relevant documents on each country's evaluation practices. The RIO database[2] (Research and Innovation Observatory) and the SIPER database[3] (Science and Innovation Policy Evaluation Repository) have been particularly valuable in this regard. Additional documents were provided by interviewees, or found by the authors on the Web. The information obtained from the interviews was triangulated with those documents. On the few occasions when there was a mismatch, we conducted additional interviews and searches.

The next step of the research design was to assign specific values to each country's attributes (See Table 2). We assigned scores of 0, 1 or 2, according to the intensity in the data (see Table 1). Regarding the assignation of values it is important to note two methodological issues. First, creating an analytical conceptual framework that aims at being used in empirical context requires one way or another to assign values to the empirical data. The value assignment can be done qualitatively (qualitative analysis of cases with in-depth rich description, relating the descriptive empirical data with the attributes of the concept) or can be done quantitatively (doing the same by assigning quantitative values to each attribute of the empirical cases under study). Each method has its pros-and-cons: the qualitative provides very rich and nuanced case-by-case in-depth analysis which is suitable for a few cases; and the quantitative method provides a better overview and overall indication of general trends, which is suitable for larger n. In our paper we have chosen a quantitative approach to value assignment for the empirical analysis because we

[2] https://rio.jrc.ec.europa.eu/en
[3] http://si-per.eu/

have a relative large sample of cases (all EU28 member states). This will allow us to keep the analysis at a level where we can meaningfully compare the countries under study.

Second, we assign ordinal values of 0, 1 or 2 according to the performance of the country on each of the four attributes. They position an item in an ordering scale, yet they do not measure any distance. This ordering is useful as it provides a conceptually solid overview of EU28 countries' evaluation practices, allowing a cross-country comparison.

In order to secure the reliability of the assignation of individual values (the coding of the data), the data was coded meticulously and repeatedly by the two authors, in an internal working procedure similar to inter-coder reliability practices.

After the full analysis of the data (assignation of scores), we verified the findings between September and October 2017 using feed-back from national experts in the field (see Annex 1). The findings were subsequently checked by the authors. The verification focused on eliminating possible misunderstandings or misinterpretations of the data. Adjustments were introduced where needed.

4. Empirical Evidence in EU28

This section provides empirical evidence about how EU28 countries are organising their evaluation practices. In this section we report the findings according to each of the four attributes. Thereafter, section 5 will report the findings according to cross-country comparison.

Table 2. Scores related to the four attributes defining system oriented innovation policy evaluation

	Coverage			**Systemic perspective**	**Temporality**	**Expertise (internal/ external)**	**Total score**
	Instrument evaluation	Policy-mix evaluation	Socio-economic				

			performance assessment				
Austria	2	2	1	2	2	2	**11**
Belgium	2	1	1	1	1	2	**8**
Bulgaria	0	0	0	1	0	1	**2**
Croatia	0	0	0	1	0	1	**2**
Cyprus	0	0	0	0	0	0	**0**
Czech Republic	0	0	1	1	0	1	**3**
Denmark	2	2	1	1	1	2	**9**
Estonia	1	1	1	1	1	2	**7**
Finland	2	2	1	2	2	2	**11**
France	2	1	1	2	1	2	**9**
Germany	2	1	2	2	2	1	**10**
Greece	0	0	0	0	0	0	**0**
Hungary	1	0	0	1	1	1	**4**
Ireland	2	2	2	2	2	1	**11**
Italy	1	0	0	0	0	0	**1**
Latvia	1	0	1	1	1	1	**5**
Lithuania	1	0	1	2	1	2	**7**
Luxembourg	0	0	0	1	0	1	**2**
Malta	0	0	0	0	0	0	**0**
Poland	1	1	1	2	1	2	**8**
Portugal	1	0	1	0	0	1	**3**
Romania	0	0	1	0	0	1	**2**

Slovakia	0	0	1	0	0	0	**1**
Slovenia	1	0	1	2	1	2	**7**
Spain	1	0	1	1	1	1	**5**
Sweden	2	1	2	2	2	2	**11**
The Netherlands	2	2	2	2	2	2	**12**
United Kingdom	2	1	1	1	2	1	**8**

4.1 Coverage

There is a wide diversity across EU28 countries in their extent of coverage of the three evaluation elements. Regarding ***policy instrument evaluations***, we have divided countries into three categories: countries where all policy instruments are evaluated, countries where only some policy instruments are evaluated, and countries where only few policy instruments are evaluated (or are simply monitored, not evaluated as such). In the first category we have the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden and the United Kingdom. In these countries there is a strong tendency to evaluate every programme, and hence we assign them a score of 2 (see table 2). Some of these countries have rigid structures for evaluations, grounded in legal or quasi-legal acts. For example, in the Netherlands, evaluations of programs are tied to the general budgetary framework and each instrument has to be evaluated (The_Netherlands_Goverment, 2014). In other countries, there is no specific legal obligation to evaluate every program but they have a strong evaluation culture. For example, in Austria or the UK, there is a strong tradition of evaluating all innovation policy programs, or a "general expectation" that all programs should be evaluated (see interviewees 1, 62).

Another group has less developed traditions and fewer legal requirements to evaluate programmes, but these countries still conduct a considerable amount of policy instrument evaluation. Such countries include Estonia, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Spain and Slovenia (score 1 in Table 2). Many of these countries assess the impact of their

innovation policy instruments following the rules of the EU Structural Funds. While the 'EU rules' only prescribe some minimum requirements regarding the rigor of the evaluations, the countries in this group have developed approaches that exceed these minimum requirements.

Finally, countries for which there is very little evidence of conducting policy instrument evaluations (i.e. received a score of 0 in Table 2) are Bulgaria, Croatia, Cyprus, Czech Republic, Greece, Luxemburg, Malta, Romania and Slovakia. These countries typically resort to either the bare minimum required by the EU Structural Fund regulations, or their practices are closer to descriptive monitoring rather than real evaluations. For example, the Czech Republic has established procedures for the "evaluation of finished programmes"(Office_of_the_Government_of_the_Czech_Republic, 2013), but in practice only basic output data of the programmes are reported (Verification 1).

As the second element of the coverage attribute, we look at ***policy-mix evaluations***. Our data show that policy-mix evaluations, being a relatively new phenomenon, are not as widespread as policy instrument evaluations. We have defined three groups of countries according to the level of their policy-mix assessments. Firstly, there are countries that have carried out assessments on additionality and/or complementarity in their policy mixes. Secondly, some countries have treated the issue of policy interactions on a smaller scale, often within the framework of other types of evaluations. While these countries do not apply policy-mix evaluations in a pure form, they are addressing the issues relevant to policy-mix and such endeavours should thus be recognized. Thirdly, there are countries with very weak or no signs of policy-mix evaluations taking place.

In the first group we find Austria, Denmark, Finland, Ireland and the Netherlands. For example, in Denmark, the Danish Agency for Science, Technology and Innovation commissioned two studies to assess the effects and interactions of different programmes on firm performance (DASTI, 2014) (Daly and Christensen, 2016). In Finland, different meta-analyses are bundled together to gain insight into the policy-mix performance (interviewee 20). In Ireland the analysis of the policy-mix forms an integral part of their comprehensive programme of evaluations (Department_of_Jobs, 2015). In the Netherlands, a policy mix analysis assessing the interactions between instruments has been carried out for the so-called top-sector policy, a strategic initiative launched by the Dutch government aimed at boosting the competitiveness of priority sectors through a combination of policy measures (interview 45).

The second group consists of countries where we have detected some signs of policy-mix thinking without full scale policy-mix evaluations: Belgium (Flanders), Estonia, France, Germany, Poland, Sweden, the United Kingdom. For example, the innovation agency Enterprise Estonia has been carrying out a biannual evaluation of the impact of its policy mix, addressing also the additionality effects of the policies (interviewee 18). In France, some of the interactions between policies have been covered in the evaluation of the "Programme d'Investissement d'Avenir" (interview 22). The countries in the third group, those that do not seem to assess the interactive effects of their policy-mixes, are Bulgaria, Croatia, Cyprus, Czech Republic, Greece, Hungary, Italy, Latvia, Lithuania, Luxemburg, Malta, Portugal, Romania, Slovakia, Slovenia and Spain.

Regarding the coverage element ***socio-economic performance assessments***, the countries are as well divided into three groups: those conducting sophisticated exercises to assess their innovation performance; those who follow their innovation indicators analytically, but less rigorously; and those who merely resort to statistical reporting. The very few countries belonging to the first group have set up specific advanced formats for analytical assessments of their innovation performance, often maintained by non-governmental entities. Here we find Germany, Ireland, the Netherlands, and Sweden. In Germany, the scientific Commission of Experts for Research and Innovation (EFI) analyses the structure and trends of Germany's innovation performance in an encompassing manner(EFI, 2017).

A large majority of the EU28 countries belong to the intermediate category, as they have developed some form of general analysis of their innovation indicators, often in association with the monitoring of national innovation strategies or similar. These countries typically assess their socio-economic performance by focusing on conventional analysis of general innovation indicators. This is the case for Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, the United Kingdom (with score 1 in Table 2). As an example, in Flanders, the Centre for Research & Development Monitoring (ECOOM) has been set up to provide the Flemish government with information on the innovation performance and reports on a biannual basis on the development of the key innovation indicators (Koenraad and Veugelers, 2015).

About one third of the EU member states do not have any specific practices for analysing their socio-economic innovation performance. Even if statistical data are collected, that is not

supported by broader analytical efforts. These countries are Bulgaria, Croatia, Cyprus, Greece, Hungary, Italy, Luxemburg and Malta. As an example, in Cyprus the statistical data on innovation performance are reported to international organizations, such as the European Commission, but no specific analyses are conducted in the country.

4.2 Systemic perspective

With regard to reports that examine systemic perspective, our data show that the large majority of EU member states recognizes the importance of paying attention to innovation policy performance and innovation system performance. However, the level of attention to these issues differs among countries. Following the three-scale measurement above, we found the following countries in the first group: Austria, Finland, France, Germany, Ireland, Lithuania, the Netherlands, Poland, Slovenia and Sweden. All of these countries have had one or several reports analyzing extensively the performance of policy with the economic perspective regarding innovation performance. These reports have often been conducted by the OECD or the World Bank, but there have also been nationally-led exercises conducted by other institutions. As an example of the latter is the Austrian "System Evaluation", carried out by a consortium of research institutes. It combines the analysis of Austrian innovation policy with insights into Austrian performance in productivity growth and innovation, its external competitiveness and the innovative performance of companies (Aiginger et al., 2009). Likewise, Germany's Expert Commission for Research and Innovation (EFI) has conducted extensive analysis of issues which exhibit important shortcomings, such as the limited digitalization and entrepreneurship in the German innovation system and its policies.

In the intermediary group we have countries that have produced reports with a strong focus on evaluating the policy dimension, but less on its relation with the innovation performance of the country. Here we find Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Germany, Hungary, Latvia, Spain, Luxemburg and the United Kingdom. Most of these countries have had a European Commission facilitated peer-review (either CREST, ERAC or PSF), where the primary focus is on policy performance and less on its relation with the innovation system performance. It is worth noting that three of the countries in this group (Croatia, Bulgaria and Luxemburg) have ordered relatively sophisticated reports that focus on innovation system performance. However, we argue that because of the lack of quality input from policy evaluations in these countries (virtually no "coverage" in all three, and hence no possibility for meta-analysis – see above), the

basis for the assessments is rather limited. It is worth noting that although the UK is a strong performer in “coverage” and in policy and economic assessments, it does not seem to be fully exploiting this potential, as it has a limited number of reports that truly examine systemic perspective. Possibly, the sheer size of its economy and its complex innovation system represents a challenge in those terms.

Finally, the last group of countries with no significant reports about systemic perspective is formed by Cyprus, Greece, Italy, Malta, Portugal, Romania and Slovakia. These countries have not taken part in any of the peer-review exercises facilitated by the European Commission, OECD or any other international organisation and neither have we found any other evidence in that regard.

4.3 Temporality

The analysis of the next attribute, namely, temporality applies the above classification of the countries into three main groups according to the data collected. First we have countries with a high degree of temporality, where various kinds of evaluations are conducted rather frequently and routinely. Secondly we have countries with a medium degree of temporality, where some types of evaluations are performed frequently, but others much less so. Finally we have countries with a low degree of temporality. In the first group of countries we find Austria, Finland, Germany, Ireland, the Netherlands, the UK and Sweden. In these countries the temporality of evaluative activity is high, with different elements of the innovation system being evaluated frequently and consistently. In the second group we have Belgium, Denmark, Estonia, France, Hungary, Latvia, Lithuania, Poland, Slovenia, and Spain. These countries display a medium level of temporality, meaning that their evaluation practices are very frequent in some aspects, but less frequent in others. In the third group we have countries such as Croatia, Czech Republic, Cyprus, Greece, Italy, Luxembourg, Malta, Portugal, Romania and Slovakia. In these countries the overall level of temporality is low, with evaluations being conducted rarely and infrequently.

4.4 Expertise

As the fourth attribute, we look at the diversity of expertise used in the system oriented evaluations of innovation policy. More specifically, we look at the extent to which EU member states are combining national and international, internal (ministerial/public) and external (e.g. private consultancies, universities, think-tanks) expertise in evaluating their innovation policies.

We assign values to the countries according to the diversity of this expertise. Firstly there are countries that make use of diversified expertise, where the expertise is both internal and external to national government bodies and where international expertise is used in innovation policy evaluation. Secondly we have countries with less diversified expertise in evaluation, where only two of the different basis of expertise listed above is present. Finally, we find countries where only one of the basis of expertise mentioned is relied upon.

In the first group we have Austria, Belgium, Denmark, Estonia, Finland, France, Lithuania, the Netherlands, Poland, Slovenia and Sweden. These countries make use of all three basis of expertise in their evaluations. For example, Finland has strong evaluative capacities in its innovation-agency TEKES and its public research institution VTT, making as well strong use of external consultants and academic institutions. Furthermore, it has had two international reviews, an OECD innovation review (OECD, 2017) and an earlier 'custom-made' international review (Veugelers et al.). As two other examples, both Lithuania and Poland have demonstrated the use of a variety of expertise in assessing their innovation policies. Lithuania has had an OECD innovation review (OECD, 2016) and a CREST review (Edler, 2007), while a government think-tank MOSTA as well as private sector evaluators have contributed significantly to its evaluative activity. In Poland, the Polish Agency for Enterprise Development (PARP) is using in-house resources as well as external evaluators to assess the innovation policy. On the international side, the World Bank carried out a strategic review of the Polish innovation system (Kapil, 2013).

The second group consists of Bulgaria, Croatia, Czech Republic, Germany, Hungary, Ireland, Latvia, Luxembourg, Portugal, Romania, Spain and the United Kingdom. They use a more limited range of expertise, combining either internal/external to the government (both national expertise), or internal to the government (national) and international expertise, or external to the government and international expertise. For example, Germany, Ireland and the United Kingdom have generally sophisticated evaluative activity, but all three use almost exclusively national expertise for evaluating their innovation policy. The UK had a CREST review in 2007 (Cunningham, 2007), but that was of limited scale and was not followed up since then.

In the third group we find Cyprus, Greece, Italy, Malta and Slovakia. These countries have a low evaluative activity in general and they typically make use of only of a single basis of expertise for their few evaluations.

5. Evidence of System oriented Innovation Policy Evaluations in EU28

Having examined the attributes one-by-one, we are going to make sense of these findings by dividing them into quartiles. Following our previous definition, a 'system oriented innovation policy evaluation' will exhibit high scores in all of the four attributes, that is: extensive coverage of evaluation elements, systemic perspective between innovation policy evaluation and innovation system assessments, high regularity, and broad expertise.

From our analysis we find that Austria, Finland, Germany, Ireland, the Netherlands and Sweden have developed comprehensive practices of system oriented innovation policy evaluation (which we might call 'holistic' due to their comprehensiveness in terms of system approach). All of these countries demonstrate a steady performance across the different categories of our typology. For example, Austria has a strong routine for evaluating all its innovation policy programmes, it presents an annual report to the parliament on the performance in the research and technology field, has had both a CREST peer review and a national "system evaluation" (also covering its policy-mix). As another example, in the Netherlands innovation policy programmes are routinely evaluated, with a policy-mix perspective being added at seven-year intervals. Furthermore, an annual report is prepared for the parliament on innovation performance, and both OECD as well as CREST reviews have been conducted.

In the second quartile of countries we find Belgium, Denmark, Estonia, France, Lithuania, Poland, Slovenia and the United Kingdom. What characterizes the countries in this group is that all of the attributes making a system oriented innovation policy evaluation are present, but with varying degrees of sophistication. In terms of coverage, while a large majority of the countries conduct evaluations in all the three main areas (policy instruments, policy-mixes and socioeconomic assessments), we find that some countries have strong instrument evaluation practices, but there is less activity in policy-mix evaluations and socio-economic performance assessments. We can also see that the countries in this group are relatively strong in employing a variety of expertise for evaluation, though with some important variation. When looking at the temporality of evaluations in the group we see that it is almost uniformly lower than in the holistic group. Again, the UK is an outlier here, as it has high regularity. Therefore, when looking at 'temporality' and

'expertise' we can see that the UK has sophisticated evaluation frameworks and demonstrates outstanding practices on several other dimensions, but is not there yet in terms of all the key features of system oriented evaluation.

In the third quartile we find countries that have generally little diversity of content and a low frequency of evaluative activity. The countries in this group include Czech Republic, Hungary, Latvia, Portugal and Spain. These countries all have some evaluation activity, but not a uniform coverage regarding content – some elements of "coverage" are there, but others not at all. We can see that none of the countries is conducting evaluations on their policy-mix. At the same time, a large majority of the countries in this group are making some effort of a systemic perspective, having ordered either a CREST, ERAC, PSF or a national strategic review. The latter effort is also contributing to some variety of expertise used in evaluations, adding an international dimension to a field mainly dominated by domestic actors. Similarly to the previous group, the overall frequency of evaluative activity in these countries is relatively low.

Last, we have countries which do not have any true system oriented innovation policy evaluation. The countries in this group are Bulgaria, Croatia, Cyprus, Greece, Italy, Malta, Luxemburg, Romania and Slovakia. None of these countries has any considerable evaluation activity. While some evaluations have taken place over time, they have been isolated examples. For example, Cyprus has had an ERAC peer review of its innovation system, but almost no other evaluations. Italy has carried out some evaluations on its policy instruments, but there is very scarce activity otherwise. While several of these countries have made plans for developing their evaluation capacities in order to provide a better understanding of the innovation system,[4] these initiatives are yet to take effect.

6. Conclusions

This paper has provided new empirical insights about an under-researched phenomenon in innovation and evaluation studies, namely, the actual practice in 'system oriented innovation

[4] For example Malta has ordered a PSF study on the monitoring of the Maltese national research and innovation strategy (Interview 43).

policy evaluations'. It has conceptualized this term, identifying its four constitutive attributes, which have then been operationalized and measured. The findings show that only six out of the EU28 countries have developed system oriented innovation policy evaluation practices (The Netherlands, Austria, Finland, Germany, Ireland and Sweden). These countries fulfil with great intensity the four attributes that define system oriented innovation policy evaluation. That is, a wide coverage of evaluations, analyses of systemic interactions between policy performance and socio-economic performance, a high level of regularity of those evaluations, and broad and varied basis of expertise. In the second group of countries their evaluation practices are less well developed. Eight out of 28 countries are found in this group: Denmark, France, Belgium, Poland, the UK, Estonia, Lithuania and Slovenia. While the countries in this second quartile are still relatively strong in instrument evaluations, the policy-mix evaluations and socio-economic performance assessments are less prominent. Also, the overall frequency of evaluations is visibly smaller. For this reason, they cannot be considered system oriented innovation policy evaluation.

The third quartile of countries consists of Latvia, Spain, Hungary, Czech Republic, and Portugal. These are countries with an uneven regularity of evaluation activities and uneven variation of the expertise. Their coverage is rather limited, and so is their systemic perspective. But these countries have made clear attempts to engage with the available expertise and tap into the available knowledge, typically from international expertise, and to comply with conditions slightly above the minimum required by external funders. These are countries which have taken the first steps towards creating some basic structures of what could in the future become a system oriented approach. Last, we find a relatively large group of countries in the European Union (9 out of 28) without any real evaluation, let alone what could be a system oriented innovation policy evaluation: Bulgaria, Croatia, Luxemburg, Romania, Italy, Slovakia, Cyprus, Greece and Malta. Our conceptual boundary is very clearly defined here, as these countries have none or extremely few of the attributes of coverage, perspective, temporality, and expertise. From our data we could not find any reasonable evidence of evaluation activities being conducted in a systemic manner. However, it is worth mentioning that some countries in this group are planning to do so in the future.

Given the current fundamental debates about the future of innovation policy in the context of innovation systems, it is somehow surprising to see that only few countries in the EU28 have truly

developed a system oriented evaluation. The limited systemic approach in evaluation means that most policy makers in Europe lack a very important source for policy learning, namely, the source that is based on a careful assessment of their own innovation system and policies' performance.

Our findings point as well to a series of highly relevant research questions for future analysis. The most obvious empirical questions have to do with how and how far system oriented innovation policy evaluations are being used: are they transformative in the sense of inducing relevant learning processes in policymaking? In what way is the evidence produced by the system oriented innovation policy evaluations used as a source for policy learning? Who are the policy learners in that process, and what are they actually learning? While some recent anecdotal evidence exists at regional and EU level (Aranguren et al., 2017) (Borrás and Højlund, 2015), further cross-national comparison is highly needed.

Moreover, there are also a series of questions which are more normative in nature, and which have to do with how countries could build up their capacity in terms of systemic evaluation approach. The questions here could be more focused on identifying the mechanisms and incentives that could make countries take that step, and the methodologies most suitable for their specific nature of innovation system and policies. We would need to start by acknowledging that there is no possible "one size fits all" model for innovation systems and policies; and that a systemic evaluation approach requires important knowledge and organisational capacities in each country. Hence, the critical question would be to identify suitable ways of building such systemic evaluation capacity at the national level.

New opportunities might emerge as well in the context of other sources of policy learning. Traditional sources of policy learning in innovation policy, such as evaluation, technology foresight and technology assessment could be combined with new sources of policy learning like experimental policy labs, ex-ante impact assessment, networks of policy-makers, or electronic forms of direct citizen engagement. Bringing these different sources together might create a solid and encompassing basis for policy learning. Therefore another set of crucial questions that remain unanswered is: to what extent are EU28 countries building capacities in these diverse sources of policy learning, and how could they best build that.

References

Aiginger, K., Falk, R., Reinstaller, A., 2009. Evaluation of Government Funding in RTDI from a Systems Perspective in Austria: Synthesis Report [reaching Out to the Future Needs Radical Change; Towards a New Policy for Innovation, Science and Technology in Austria: the Summary Report is Based on Nine Special Reports]. WIFO.

Aranguren, M.J., Magro, E., Wilson, J.R., 2017. Regional competitiveness policy evaluation as a transformative process: From theory to practice. Environment and Planning C: Politics and Space 35, 703-720.

Arnold, E., 2004. Evaluating research and innovation policy: a systems world needs systems evaluations. Research Evaluation 13, 3-17.

Borrás, S., 2011. Policy Learning and Organizational Capacities in Innovation Policies. Science and Public Policy 38, 725-734.

Borrás, S., Højlund, S., 2015. Evaluation and policy learning: The learners' perspective. European Journal of Political Research 54, 99-120.

Collier, D., Laporte, J., Seawright, J., 2008. Typologies: Forming concepts and creating categorical variables, in: Box-Steffensmeier, J., Brady, H.E., Collier, D. (Eds.), The Oxford handbook of political methodology. Oxford University Press, Oxford, pp. 152-173.

Cunningham, P., Edler, J., Flanagan, K., Larédo, P., 2016. The Innovation Policy Mix, in: Edler, J., Cunningham, P., Gök, A., Shapira, P. (Eds.), Handbook of Innovation Policy Impact. Edward Elgar, Cheltenham.

Cunningham, P.e.a., 2007. Policy Mix Peer Reviews: Country Report. United Kingdom, a Report of the CREST Policy Mix Expert Group., Brussels.

Dahler-Larsen, P., 2012. The Evaluation Society. Stanford University Press, Stanford, Ca.

Daly, M., Christensen, M.L., 2016. The Effect of Multiple Participations in the Danish Innovation and Research Support System. Centre for Economic Business Research (CEBR), Copenhagen.

DASTI, 2014. The Short-run Impact on Total Factor Productivity Growth of the Danish Innovation and Research Support System, Research and Innovation: Analysis and Evaluation No. 2, Copenhagen.

Department_of_Jobs, E.a.I., 2015. Evaluation of Enterprise Supports for Enterprise: Synthesis Report and Conclusions, Dublin.

Edler, J., 2007. Policy Mix Peer Reviews: Country Report. Lithuania, a Report of the CREST Policy Mix Expert Group, Brussels.

Edler, J., Berger, M., Dinges, M., Gök, A., 2012. The practice of evaluation in innovation policy in Europe. Research Evaluation 21, 167-182.

Edler, J., Ebserberger, B., Lo, V., 2008. Improving Policy Understanding by means of Secondary Evaluation. R&D Evaluation 17, 175-186.

Edquist, C., 2005. Systems of Innovation. Perspectives and Challenges, in: Fagerberg, J., Mowery, D.C., Nelson, R.R. (Eds.), The Oxford Handbook of Innovation. Oxford University Press, Oxford.

EFI, 2017. Report on research, innovation and technological performance in Germany 2017. EFI, Berlin.

Feller, I., 2007. Mapping the frontiers of evaluation of public-sector R&D programs. Science and Public Policy 34, 681-690.

Flanagan, K., Uyarra, E., Laranja, M., 2011. Reconceptualising the 'policy mix' for innovation. Research Policy 40, 702-713.

Goertz, G., 2006. Social Science Concepts. A User's Guide. Princeton University Press, Princeton.

Hage, J., Jordan, G., Mote, J., 2007. A theory-based innovation systems framework for evaluating diverse portfolios of research, part two: Macro indicators and policy interventions. Science and Public Policy 34, 731-741.

Jordan, G.B., Hage, J., Mote, J., 2008. A theories-based systemic framework for evaluating diverse portfolios of scientific work, part 1: Micro and meso indicators. New Directions for Evaluation 2008, 7-24.

Kapil, N., 2013. Poland - Enterprise Innovation Support Review: From catching up to moving ahead. World Bank, Washington DC.

Koenraad, D., Veugelers, R., 2015. Vlaams Indicatorenboek, in: Overheid, V. (Ed.), Brussels.

Kuhlmann, S., Boekholt, P., Georghiou, L., Guy, K., Heraud, J.-A., Laredo, P., Lemola, T., Loveridge, D., Luukkonen, T., Moniz, A., Polt, W., Rip, A., Sanz-Menendez, L., Smits, R.E., 1999. Improving Distributed Intelligence in Complex Innovation Systems, Munich Personal RePEc Archive.

Kuhlmann, S., Shapira, P., Smits, R.E., 2010. Introduction. A Systemic Perspective: The Innovation Policy Dance, in: Smits, R.E., Kuhlmann, S., Shapira, P. (Eds.), The Theory and Practice of Innovation Policy. An International Research Handbook. Edward Elgar, Cheltenham, pp. 1-22.

Lundvall, B.-Å., 1992. National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning. Pinter, London.

Magro, E., Wilson, J.R., 2013. Complex innovation policy systems: Towards an evaluation mix. Research Policy 42, 1647-1656.

Martin, B.R., Nightingale, P., Yegros-Yegros, A., 2012. Science and technology studies: Exploring the knowledge base. Research Policy 41, 1182-1204.

Molas-Gallart, J., Davies, A., 2006. Toward Theory-Led Evaluation: The Experience of European Science, Technology, and Innovation Policies. American Journal of Evaluation 27, 64-82.

Nelson, R.R., 1993. National innovation systems : a comparative analysis. Oxford Univ. Press, New York.

OECD, 2016. OECD Reviews of Innovation Policy: Lithuania 2016. OECD, Paris.

OECD, 2017. OECD Reviews of Innovation Policy: Finland 2017. OECD, Paris.

Office_of_the_Government_of_the_Czech_Republic, 2013. Methodology of Evaluation of Research Organizations and Evaluation of Finished Programmes (valid for years 2013 - 2015). Prague.

Sanderson, I., 2002. Evaluation, Policy Learning and Evidence-Based Policy Making. Public Administration 80, 1-22.

Sartori, G., 1970. Concept Misformation in Comparative Politics. The American Political Science Review 64, 1033-1053.

Smits, R., Kuhlmann, S., 2004. The rise of systemic instruments in innovation policy. International Journal of Foresight and Innovation Policy 1, 4-32.

Swedberg, R., 2012. Theorizing in Sociology and Social Sciences: Turning to the Context of Discovery. Theory and Society 41, 1-40.

The_Netherlands_Goverment, 2014. Regulation on Periodic Evaluation, available at http://wetten.overheid.nl/BWBR0035579/2015-01-01 (Accessed: 09.09.2017).

Veugelers, R., Aiginger, K., Edquist, C., Breznitz, D., Murray, G., Ottaviano, G., Maliranta, M., Evaluation of the Finnish National Innovation System - Policy Report. Ministry of Education and Ministry of Employment and the Economy., Helsinki.

Annex 1. List of interviewees

1	Austria	Senior manager	Austrian Ministry for Transport, Innovation and Technology	29.04.16
2	Austria	Senior manager	Joanneum Research	04.11.16
3	Austria	Senior policy expert	Austrian Institute of Technology	24.03.17
4	Belgium	Senior manager	Scientific and Technical Information Service	01.06.16
5	Belgium	Senior policy expert	Directorate of Economic Policy, Wallonia	16.11.16
6	Belgium	Associate professor	KU Leuven	14.06.17
7	Bulgaria	Senior manager	Ministry of Economy	01.06.16
8	Bulgaria	Independent innovation policy expert		19.05.17
9	Croatia	Senior manager	Ministry of Science, Education and Sports	06.05.16
10	Croatia	Senior manager	Ministry of Economy, Entrepreneurship and Crafts	27.01.17
11	Cyprus	Senior manager	Research Promotion Foundation	23.05.16
12	Cyprus	Senior manager	Ministry of Energy, Commerce, Industry and Tourism	22.11.16
13	Czech Republic	Senior manager	Prime Minister's Office	07.11.16 (written)

14	Czech Republic	Senior manager	Ministry of Economy and Trade	02.12.16 (written)
15	Denmark	Senior policy expert	Danish Agency for Science, Technology and Innovation	27.05.16
16	Denmark	Senior manager	Danish Agency for Science, Technology and Innovation	18.01.17
17	Estonia	Senior manager	Ministry of Economic Affairs and Communications	27.01.16
18	Estonia	Senior manager	Enterprise Estonia	30.12.16
19	Finland	Senior manager	Ministry of Employment and the Economy	20.01.16
20	Finland	Senior manager	TEKES	15.11.16
21	France	Senior manager	Ministry for Economy, Industry and Digital Affairs	09.12.15
22	France	Senior policy expert	France Strategie	17.11.16
23	France	Professor	Université de Paris-Est	15.03.17
24	Germany	Senior manager	Federal Ministry for Science and Technology	28.01.16
25	Germany	Senior manager	Max Planck Institute for Innovation and Competition, Munich	16.05.16
26	Greece	Senior manager	Ministry of Education, Research and Religious Affairs	04.05.16
27	Greece	Senior policy expert	Ministry of Economy	26.10.16 (written)
28	Greece	Professor	University of Athens	20.03.17

29	Hungary	Senior manager	National Research, Development and Innovation Office	23.05.16
30	Hungary	Senior manager	Prime Minister's Office	27.03.17
31	Ireland	Senior manager	Department of Jobs, Enterprise and Innovation	15.06.16
32	Ireland	Senior policy expert	Department of Jobs, Enterprise and Innovation	21.06.16
33	Italy	Policy officer	Ministry of Economic Development	24.10.26
34	Italy	Senior official	Agency for Cohesion Policy	07.04.17 (written)
35	Italy	Professor	Università degli Studi di Urbino	31.03.17
36	Latvia	Senior manager	Ministry of Economics of the Republic of Latvia	28.01.16
37	Latvia	Senior manager	Ministry of Education and Science	20.02.17
38	Latvia	Director	Ministry of Education and Science of Latvia	23.02.17
39	Lithuania	Senior manager	Ministry of Economics of the Republic of Lithuania	17.03.16
40	Lithuania	Senior manager	Research and Higher Education Monitoring and Analysis Centre (MOSTA)	12.01.17
41	Luxembourg	Senior manager	Ministry of Higher Education and Research	02.06.16
42	Luxembourg	Independent expert		24.05.17
43	Malta	Senior policy expert	Malta Council for Science and Technology	29.04.16

44	Malta	Senior manager	Malta Enterprise	15.02.17
45	The Netherlands	Senior manager	Ministry of Economic Affairs	26.01.16
46	The Netherlands	Senior strategist	the Netherlands Organisation for applied scientific research (TNO)	10.11.16
47	Poland	Senior manager	Ministry of Economic Development	19.05.16
48	Poland	Senior manager	Polish Agency for Enterprise Development (PARP)	08.11.16
49	Portugal	Senior manager	National Innovation Agency	20.05.16
50	Portugal	Senior policy expert	Ministry of Economy	17.01.17
51	Romania	Senior counsellor	National Authority for Scientific Research and Innovation	02.06.16
52	Romania	Senior counsellor	National Authority for Scientific Research and Innovation	21.02.17 (written)
53	Slovakia	Senior manager	Ministry of Economy	30.05.16
54	Slovakia	Senior policy expert	Slovak Innovation and Energy Agency	24.11.16 (written)
55	Slovenia	Professor	University of Ljubljana	21.06.16
56	Slovenia	Senior manager	Ministry of Economy	01.07.16
57	Spain	Senior manager	Ministry of Economy and Competitiveness	02.06.16
58	Spain	Senior policy expert	Centre for Industrial Technological Development (CDTI)	10.11.16
59	Spain	Professor	Universidad Autónoma de Madrid	26.06.17

60	Sweden	Senior manager	Ministry of Enterprise and Innovation	14.01.16
61	Sweden	Senior manager	VINNOVA	29.11.16
62	United Kingdom	Senior manager	Department for Business, Innovation & Skills	25.05.16
63	United Kingdom	Senior manager	Innovate UK	18.11.16