

# **Complex Innovation Policy Systems: Towards an Evaluation Mix**

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## **Abstract**

The mix of contemporary innovation policies impacting on a given territory are typically characterised by quite different underlying rationales and instruments. Complexity is further increased by multi-level considerations. Thus policies with different characteristics and from different administrative levels are continually interacting with one another in complex policy systems. These interactions significantly complicate the evaluation of individual policies, and raise a series of difficult questions around how their respective evaluation processes should interact to facilitate better understanding of the performance of policy systems. This paper contributes with a simplified definition of an innovation policy system as the conjuncture of policy mix and multi-level dimensions, from which a series of steps are proposed for arriving at an evaluation mix relevant for the specific characteristics of a given policy space. These ideas are illustrated with application to the case of the Basque Country region of Spain and signal an agenda for further applied policy research.

**Keywords:** Innovation policy; policy mix; policy evaluation; multilevel governance.

**JEL Codes:**

## I. INTRODUCTION

The panorama of policies designed to stimulate and facilitate innovation has undergone fundamental growth and evolution during the last few decades. This is related to the relatively newly-acknowledged centrality of innovation for territorial competitiveness, alongside recognition that innovation is in fact a systemic rather than linear process. Policy rationales have evolved in response to these trends. From predominantly neoclassical approaches focused on science and technology policies, they have widened to include evolutionary-systemic frameworks with a more institutional focus and a greater importance placed on interactions within systems (Smith, 2000; Laranja *et al.*, 2008; Borrás, 2009). This has resulted in a large increase in policy complexity, whereby in practice it is common for many innovation policies to co-exist within the same country or region, based on different rationales, employing different instruments, and corresponding to different policy domains.

In line with this increased complexity, it has recently become fashionable to talk about the concept of ‘policy mix’ when referring to the innovation policies that co-exist within a territory. Flanagan *et al.* (2011), however, argue that despite the proliferation of normative assertions about desirable ‘policy mixes’, the term itself remains ill-defined and under-conceptualised. This is perhaps unsurprising given the “expanding portfolio of innovation policy instruments” (*ibid.*: 703) that are employed with quite distinct underlying policy rationales; from framework policies to targeted policies, or from resource-based science and technology policies to networking policies, for example. Moreover judgements about what constitutes the policy mix at any given level of territorial analysis are complicated further by the multiple administrative levels from which policies with impact in that territory are designed and implemented. Regions are particularly interesting units of analysis in this regard because they represent an administrative scale at which multi-level considerations are pronounced. They are what Uyarra & Flanagan (2010) refer to as ‘policy spaces’, in which policy mixes from European, national, regional and sub-regional levels have impacts.

Leaving aside the precise definition of policy mix employed to capture this complexity, the reality is that a range of different policies oriented towards improving innovation are continually interacting with one another. As a result of these interactions policy outcomes are generated that do not necessarily correspond neatly with the stated aims of

individual policies, and are indeed potentially greater than the sum of their individual impacts. Moreover, as emphasised by Flanagan *et al.* (2011: 706), the dynamics of the policy process is itself a considerable source of complexity, given that the agency of actors is “enabled, shaped and constrained by the behaviour and expectations of other actors and by institutions, which themselves have been shaped by earlier action and institutions.” They suggest therefore that “the focus for innovation policy analysis should be on incremental/adaptive learning, experimentation, reflection, debate and argument about means/ends, and even creative tensions” (*ibid.*: 711). A concrete step forward in this regard is to focus on an element of the policy process that is fundamental for reflection and learning: policy evaluation.

The messy, complex and multi-level reality depicted by Flanagan *et al.* (2011) significantly complicates the evaluation of innovation policies. The typically-adopted approach of employing specific techniques to evaluate isolated policy interventions is limited in a systemic context, and indeed its widespread adoption provides an obstacle to more sophisticated understanding of innovation policy mixes and their evolution. Indeed there is a pressing need for forms of coordination and/or integration of evaluation processes if they are to accurately capture the interactive effects that characterise policy systems. Contributions by Arnold (2004) and Edler *et al.* (2008) have highlighted this need, making important conceptual advances with regards the requirements of system evaluations. What is missing is a more precise articulation of the practical steps that can be taken with respect to a given policy space. This is particularly relevant at regional level, where there are a multitude of innovation policies from different administrative levels that exhibit potential complementarities and contradictions in their impacts in the region, yet where in many cases even the evaluation of individual interventions is at best sketchy and limited. This paper aims to provide insight on how regional policy-makers can practically approach the challenges posed to them by an increasingly complex systemic policy context.

The paper begins in Section II by setting out a simplified definition of an innovation policy system as the conjuncture of two dimensions. The first dimension refers to the mix of policy rationales, domains and instruments, while the second dimension refers to the mix of administrative levels from which policies originate. These dimensions are specific to the particular policy space where policy impacts are being evaluated (for example the region). This simple specification provides a basis to analyse in Section III

the need for an appropriate, holistic ‘policy evaluation mix’ that builds on recognised limitations and recent advances in policy evaluation approaches. The paper sets out a series of practical steps for arriving at an evaluation mix relevant for the specific characteristics of a given policy space. These ideas are illustrated in Section IV, where the initial steps of the evaluation mix process are applied to the Basque Country region of Spain. This illustration provides the basis for discussion in the final concluding Section of a series of key issues for understanding and improving the dynamics of complex policy systems, alongside an agenda for future applied research.

## **II. INNOVATION POLICY MIXES AND INNOVATION POLICY SYSTEMS**

Application of the ‘policy mix’ concept to the innovation arena is very recent (Nauwelaers et al. 2009; Flanagan *et al.* 2011; OECD 2010), and there is not yet a clear understanding of its implications for the design, implementation and evaluation of innovation policies. According to Flanagan *et al.* (2011), the concept of policy mix has its origins in Mundell’s (1962) observations on the relationship between monetary and fiscal policy, from which it informed later debates on European monetary union. They argue that it found its way into the innovation policy discourse from around 2000 via the R&D considerations emerging in environmental policy debates and the macroeconomic policy discussions around the Lisbon Council.

The attractiveness of the policy mix concept in an innovation context is clear given the progressively increasing complexity that has characterised this policy field over recent decades. This complexity corresponds with an evolution in innovation theories and policy rationales. The traditional neoclassical rationale is rooted in market failure analysis, whereby markets are posited to provide sub-optimal knowledge creation given externalities and appropriability concerns. This is strongly related to so-called ‘linear’ approaches to innovation, which have a predominantly in-firm focus on science, research and technology. It leads in practice to policies designed to subsidise R&D and/or strengthen innovation incentives through ensuring intellectual property rights (Smith, 2000). The linear model of innovation is no longer the prevailing perspective, however. The last two decades have corresponded with the rise of evolutionary-systemic perspectives, resulting in a mix of policies with distinct rationales.

While neoclassical rationales respond to market failures, systemic rationales respond to evolutionary or system failures (or problems)<sup>1</sup> (Edquist, 2001; Laranja *et al.*, 2008; Smith, 2000). These justify the need for intervention within innovation systems in which different actors and institutions interact to develop and diffuse new technology and create and transfer new knowledge (Metcalf, 1995). They may therefore “call for actions contrary to conditions of perfect competition, for example, cooperation and collaboration between firms to facilitate knowledge flows, government regulation and the creation of incentives” (Smith, 2000: 94). While there is no clear consensus in the literature about evolutionary and systemic failures or problems (Laranja *et al.*, 2008), there are some attempts at classifying them, both on a theoretical basis (Bach and Matt, 2002; Carlsson and Jacobsson, 1997; Chaminade *et al.*, 2009; Edquist, 2001; Lundvall and Borrás, 1997; Smith 2000) and from a regional perspective (Laranja *et al.*, 2008). A key dimension of these classifications is the differentiation between problems with regards the components of the system and problems with regards the dynamics of the system (Chaminade *et al.*, 2009).

Despite this evolution of policy rationales, there is not a direct translation of the changing theoretical imperatives into policy formulation processes. Policies are by definition path-dependent, evolving from previous policies, and thus there is not a direct substitution of rationales in the policy-making process. This results in a situation in which there are neither pure neoclassical nor pure evolutionary-systemic policies (Flanagan *et al.*, 2011). Rather, in any given innovation system policies with different underlying rationales co-exist.

In parallel to the evolution in rationales, the range of policy instruments employed has also altered to include more systemic instruments (Smits and Kuhlmann, 2004). Innovation policy instruments have traditionally been *hard* instruments, mainly economic instruments, which aim to impact on the quantity and distribution of goods and services (Howlett, 2005). From the 1990s they have become more sophisticated, however, introducing new demand-based and interactive elements. In addition, *soft* and non-coercive instruments, in particular emphasising cooperation between actors, have

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<sup>1</sup> Edquist (2008) pleads for a substitution of the term ‘failure’ for ‘problem’, arguing that failure is a neoclassical concept.

appeared as a consequence of the evolution towards systemic policy rationales (Borrás, 2009). However new instruments do not simply substitute previous ones, whose objectives can also be modified in order to adapt them to the new systemic rationales (Nauwelaers and Wintjes, 2003; Lundvall and Borrás, 2005; Laranja *et al.*, 2008). In consequence the mix of policy rationales characterising a given innovation system is complemented by a mix of policy instruments, themselves targeted towards a mix of different actors within the system.

A third element of complexity in this policy mix refers to policy domains. Innovation theories have evolved from viewing science and technology as the key drivers of innovation, to the assumption that learning in a broader sense is the central process. Moreover, innovation itself is now seen to include non-technological aspects such as organisational and social innovations. A consequence of this evolution can be appreciated in what Borrás (2009) calls innovation policy deepening. This implies that explicit innovation or R&D policies are not the only policy domain that includes innovation-related objectives. Innovation deepening has led to widespread infiltration into other policy domains, including industrial policy, financial policy and also sector specific domains such as health, education or energy.

Defining complexity in terms of the policies that impact on a given territory rests therefore on the clarification of innovation policy boundaries (Flanagan *et al.*, 2011), and specifically on the identification of the mix of co-existing policy rationales, instruments (and associated targeted actors), and domains. However, there is an additional element of complexity with respect to the different administrative levels from which policies originate. Indeed the mix of rationales, instruments and domains that impact on a region, for example, are not confined to policies administered by the regional government. They typically also include other mixes of policies administered at lower and higher territorial scales: city, national, super-national, *etc.*. In addition to the ‘policy mix’ dimension we can therefore identify a second ‘multi-level’ dimension of innovation policy complexity.<sup>2</sup>

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<sup>2</sup> Note that Flanagan *et al.* (2011) take a different approach to conceptualising this complexity. They identify four dimensions to policy mix in terms of the spaces in which policy interactions can occur. These include an abstract ‘policy space’, which they link to the co-existence of different policy domains, and more concrete ‘geographical’ and ‘governance’ spaces, referring respectively to physical and multi-level dimensions. The fourth dimension is time. We opt for a simplification into a broader ‘policy mix’

With regards this second dimension, the ‘de-territorialisation’ of socioeconomic relationships associated with globalisation (Scholte, 2000) has simultaneously served to emphasise the importance of proximity-based relationships rooted in regional and local systems (Storper, 1997; Scott, 1998; Morgan, 2004). This has corresponded on the one hand with a decentralisation in the governance of innovation policies from national governments to regional and local levels, in line with the theoretical evolution in innovation system analysis from national to regional systems (Cooke *et al*, 2008). On the other hand, there has also been an extension of policy competences at certain supra-national levels, for example the European Union (Kuhlmann, 2001).

While there may be some policies more suitable for national levels (i.e. science and R&D policies that need greater concentration of resources) and others more suitable for regional and sub-regional levels (i.e. networking policies that rely on proximity) (Koschatzky and Kroll, 2007; Koschatzky and Stahlecker, 2010), in practice a wide range of innovation policies are implemented at all levels. In addition to national and regional innovation policies, transnational policies with different scopes and impacts have been implemented in recent decades by the European Union. This situation has led to a *governance gap* between the different levels of innovation policy administration (European, national, regional, local) (Kuhlmann, 2001) that might lead to overlaps among different policy initiatives. Moreover it implies that regions, for example, can be considered as overlapping ‘policy spaces’ in which various policies from different levels are being felt (Uyarra and Flanagan, 2010).

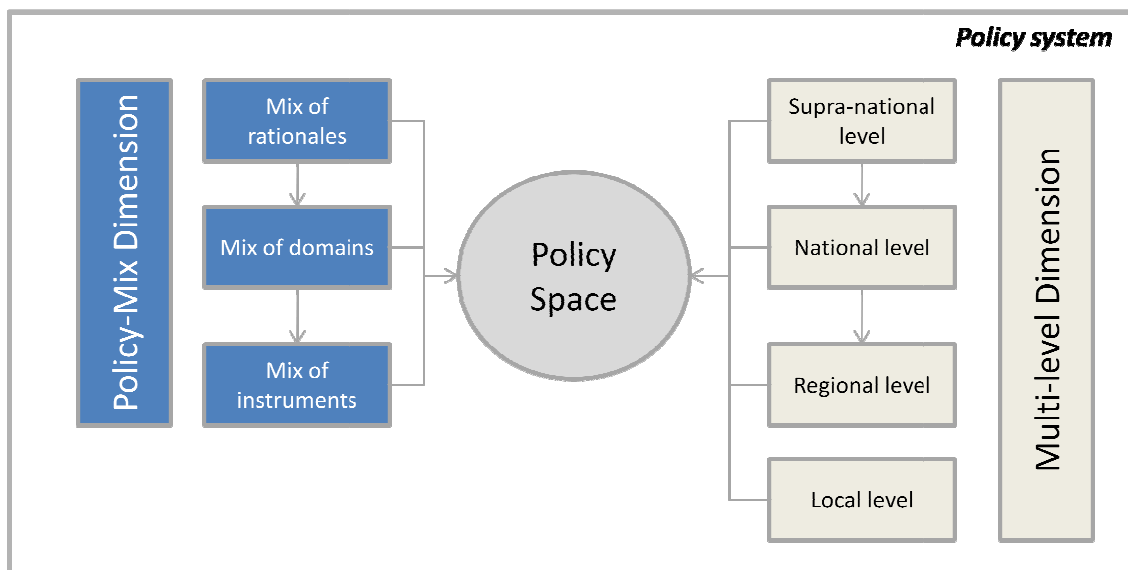
When these two policy dimensions (innovation policy-mix and multi-level governance) interact in a given policy space, they constitute a concrete policy-system (see figure 1). As such we define a policy system as the interplay between the policy-mix dimension and the multi-level dimension that is specific to a given policy space, e.g. a region. Understanding interactions among multi-level policy-mixes impacting in a territory would constitute a holistic consideration of innovation policy and support policy-learning processes. Indeed, there is a clear consensus developing in the literature about the need for understanding these interactions and impacts, through for example systemic

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dimension and a more specific ‘multi-level’ dimension to ease the application to policy evaluation at a regional level.

evaluations (Arnold, 2004; Molas-Gallart and Davies, 2006; Edler *et al.*, 2008; Flanagan *et al.*, 2011). However, little advance has been made towards practical evaluation approaches that consider both policy-mix and multi-level dimensions impacting in the same territory and that can be feasibly applied. This is the focus of the next Section.

**Figure 1: Dimensions of an Innovation Policy System**



### III. TOWARDS AN EVALUATION MIX FOR INNOVATION POLICY SPACES

While in some respects evaluation approaches have followed a similar evolution to innovation policies, they have not yet reached the degree of sophistication required to capture the complex interactions that take place within a given policy system. In this sense the practice of policy evaluation lags behind advances in innovation theory (Molas-Gallart and Davies, 2006). In particular, there is a lack of holistic but feasible evaluation approaches that consider interactions among policies from different levels that impact in a given territorial space.



### *Developments in evaluation theory, practice and purpose*

Recent developments that have emerged in evaluation theory are focused largely on changes in the additionality concept that justifies policy intervention by attributing an additional impact to policies that would not otherwise have taken place. Rooted in neoclassical theory, the concepts of input and output additionality are traditionally the most commonly used in policy evaluation (David *et al.*, 2000; Clarysse *et al.*, 2009). Input additionality refers to the additional amount of resources that subsidised firms invest in the innovation process, whereas output additionality measures the additional innovation outputs achieved as a consequence of policy intervention. They therefore respond explicitly to market failures in the neoclassical sense. In recent years, and in line with the systemic turn in innovation theory, a complementary concept has emerged in the literature: behavioural additionality. Linked to an evolutionary view of the economy, this refers to changes in firms' behaviour as a result of policy support (Bach and Matt, 2002). These effects are perceived in a longer term than with regards other types of additionality, and according to Georghiou (2002) they are closer to addressing system failures.

However, while this evolution of the additionality concept is reflected in theory, there have been few evaluation practices that have focused on understanding behavioural additionality effects (Clarysse *et al.*, 2009). Input and output additionality have typically been evaluated through quantitative approaches that seek to establish cause-effect relationships between a policy measure and the additionality generated. While such approaches fit policy rationales that are relatively linear, systemic innovation policies are more difficult to evaluate in this way due to the difficulty of capturing more complex cause-effect relationships and the more intangible benefits associated with behavioural additionality. As a consequence, policies such as networking or cluster policies have tended to be approached using qualitative and case-based analysis (Pitelis *et al.*, 2006; Aranguren *et al.*, 2008; Borrás and Tzagdis, 2008). It is rarer still to find approaches that integrate the three additionality measures, perhaps because it is common to consider the two main policy rationales as substitutive approaches instead of recognising that in policy practice they in fact coexist and are likely to interact. Indeed, innovation policy mixes will typically include both neoclassical and evolutionary type policies at the same time; for example, specifically targeted STI policies and more

generic networking policies. For that reason, an overall understanding of innovation policy impacts requires the integration of different approaches to additionality evaluation (input, output and behaviour). This implies both an underlying approach that appreciates the systemic context of innovation policy, and a triangulation of the evaluation methods appropriate for different elements of the policy mix (Diez, 2002; Aranguren *et al.*, 2011).

Along with developments in evaluation concepts and approaches, the purpose of evaluation has also evolved. Evaluations have traditionally been conducted for accountability purposes (summative evaluations), and for this reason have generally taken place *ex-post*. However, evaluations focused on learning about the policy are becoming more popular as it is acknowledged that they can contribute to improving the design and implementation of policies in real time (formative evaluations). Therefore evaluation purposes are moving from static pieces of information about policies' effectiveness towards dynamic learning processes that interact with policy-making practices and therefore give evaluation an undeniable added value. This purpose is even more important in complex and systemic realities, in which individual and narrow evaluations only give information about part of the policy effects on the system and its components. Moreover, as Koschtzky & Kroll (2007) and Kuhlmann (2003) argue, the strategic intelligence and policy learning resulting from formative evaluation processes are critical also for effective multi-level governance.

#### *Systems considerations in evaluation*

The importance of triangulating evaluation methods in response to a new mix of policy rationales and of developing a learning-centred focus to evaluation are both captured in more general recognition of the value that systems concepts can add to evaluation. Imam *et al.* (2007: 8), for example, argue that systems concepts can contribute different perspectives to evaluation that include “seeing the complicated as simple but not simplistic; being highly critical of boundaries that define what is “in” and what is “out” of the frame of enquiry; and the notion that deeper meaning-making is more likely to promote valuable action than valuable data”. With regards the problems faced in the evaluation of innovation policies, there is significant value in each of these propositions. Firstly, the balance between simplifying without being simplistic is critical in designing

evaluations that are sensitive to the real complexities of innovation policy systems, yet easy to relate-to for policy-makers. Secondly, the complex mix of rationales, domains and instruments from different administrative levels means that drawing boundaries effectively is a key aspect of ensuring this balance. Finally, the shift in evaluation priorities towards facilitating policy learning tends to premium valuable action over valuable data.

In practical terms the integration of an appreciation of systemic dynamics into innovation policy evaluation implies a move from isolated, individual evaluations to meta-evaluations or secondary analyses that build on individual evaluations in trying to capture the systemic nature of policies. Arnold (2004), for example, has proposed three different levels of evaluation in a systemic world. The continued evaluation of individual policy interventions constitutes a bottom-up element, while assessment of the overall health of innovation systems provides a top-down element and “bottleneck analysis” is also required at meso (or sub-system) level “to explore the systems role of institutions, classes of actors, clusters and so on” (Arnold, 2004: 12-13). Logically, analysis at each of these levels must acknowledge the relationship with analysis at other levels, and there are implications for the methods used both in individual evaluations and for bringing individual evaluations together.

Edler *et al.* (2008) argue that the results of specific individual policy evaluations can and should be combined in secondary analysis that facilitates a more systemic understanding. They propose what they call ‘evaluation synthesis’ as a modified form of meta-analysis that combines multiple individual evaluations of similar programmes so as “to assess the overall combined effects, redundancies, contradictions and remaining bottlenecks of policy interventions” (Edler *et al.*, 2008: 176). The first step in this process is a meta-evaluation in the mould of Cooksy and Caracelli (2005: 31): “systematic reviews of evaluations to determine the quality of their processes and findings”. This serves as a preparatory stage for either a statistical ‘meta-analysis’ of the data from the individual evaluations or, more appropriately given the complex reality of innovation policies and associated heterogeneity in programmes evaluated and methods employed, for an ‘evaluation synthesis’. An evaluation synthesis is effectively “a narration of policy implications” (Edler *et al.*, 2008: 182) that aggregates the findings of individual evaluations and should also take into account policies for which an individual

evaluation has not yet been conducted. It is a qualitative approach that is open to greater adaptability to the limitations in terms of completeness and consistency that exist when evaluating complex innovation systems. As such it seems in line with Arnold's (2004: 14) argument that "evaluation, like the policy-making process, becomes increasingly *evolutionary*, no longer seeking an overall optimum" and "in a certain sense less rigorous (because it is less complete) as we move to higher levels".

### *Towards a practical approach for policy learning*

While the advances signalled provide important theoretical justification for holistic approaches to evaluating inter-connected innovation policies, they fall short of developing a practical approach that can feasibly be adopted to facilitate policy learning. The theoretical debates tend to remain abstract and distant from the realities faced by policy-makers seeking to evaluate and improve their interventions, but often with severe practical limitations. The complexity of Edler *et al.*'s (2008) evaluation synthesis, for example, does not sit easily with the typically low development of evaluation practices with regards innovation policies in many places. As such it is important to provide a framework that not only facilitates secondary analysis of already-conducted evaluations but that can also guide the development of appropriate primary analysis of programmes in ways that are sympathetic to systemic realities. This opens the potential for evaluation methods to be adapted from the outset in ways that facilitate the analysis of interactive effects between different policies.<sup>3</sup> Most importantly, there is a need to articulate a process that is simple to relate to for the policy-makers that have remit and capabilities to act in a given policy space; a step-by-step process that enables each individual evaluation to be integrated in an 'evaluation mix' appropriate for its systemic context, and that also facilitates policy learning at each step.

In this regard we propose a six-step 'evaluation mix protocol' as set out in Table 1. This is designed to be applied in a given policy space. In this paper we take the region as an example.<sup>4</sup> Sub-national regions are acknowledged as an important unit of analysis for innovation policy by the large literature dedicated to regional systems of innovation

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<sup>3</sup> For a case in study see Magro's (2011) application of a method to account for the interactive effects of policies targeted at the same recipient firms from different administrative levels in Spain.

<sup>4</sup> In principle the protocol could also be applied to policy spaces that correspond with other levels of territory, for example the national level.

(Cooke, 1992; Cooke *et al.*, 1997; Tödling and Tripl, 2005). Moreover, it is an administrative scale at which multi-level considerations are pronounced, certainly within most European countries. In this case the focus of the protocol is the universe of policies that have an impact in the region in question, even where they originate from other administrative levels. As such the first step in the protocol is to carefully draw the policy system that corresponds to the policy space in question. This is a critical initial step given the need to be clear about boundaries if we are to sufficiently simplify the existing complexity (Imam *et al.*, 2007). In line with our definition of policy system (Figure 1), these boundaries need to be defined in terms of the policy mix dimension (rationales, domains and instruments), and the multilevel dimension, in each case asking which aspects are considered 'in' and which aspects 'out' of the system to be analysed. While ideally this step should seek to reflect the complete innovation policy system, the degree of completeness can be adapted to the situation; for example if there are compelling reasons to present a more simplified picture of reality.

Once the policy system has been drawn, step two is to select a rationale for in-depth analysis. In this sense rationales are seen to sit at the top of the hierarchy of elements in the policy mix, and within each rationale it will be possible to identify domains where policies exist and a range of specific instruments that are implemented from different administrative levels. It will also be possible to associate these instruments with the actors that are targeted as policy recipients. The third step in the process is therefore to conduct a cursory analysis of the mix of domains, instruments, administrative levels and targeted actors that are relevant for the specific rationale selected, looking in particular for overlaps and complementarities.

The fourth step is akin to a meta-analysis (Arnold, 2004; Edler *et al.*, 2008), and involves identifying current evaluation practices with respect to the policy scenario depicted in step three. There are three key issues: (i) to identify what is evaluated and what is not evaluated (i.e., where there are gaps); (ii) to identify the approaches and methods that are employed where evaluation does currently take place; and (iii) to evaluate to what extent existing evaluations take into account the interactions between instruments and administrative levels within this policy rationale.

Building on this secondary analysis, the aim of the fifth step is to first design and then put into action an integrated framework for evaluation of the policy instruments that follow the selected rationale. This step thus moves beyond a meta-analysis and seeks to influence evaluation practice in two key ways: (i) improving existing evaluation processes, where possible, so as to integrate techniques that facilitate a better understanding of systemic interactions with other policies; and (ii) designing such evaluation processes from scratch where they currently don't exist. The end result should be a coherent evaluation framework for the range of different instruments that seek to respond to the same rationale, taking into account interactions between the different policy domains and administrative levels where these instruments are located.

**Table 1: Evaluation Mix Protocol**

|   |  |
|---|--|
| <b>STEP 1</b>                                 | Draw the policy system and establish its boundaries in terms of rationales, domains and instruments (policy mix dimension) and administrative scales (multi-level dimension) |
| <b>STEP 2</b>                                 | Select a rationale   |
| <b>STEP 3</b>                                 | Analysis of the mix of domains and instruments at different administrative levels that fall under the selected rationale, looking for overlaps and complementarities         |
| <b>STEP 4</b>                                 | Identify current evaluation practices and the extent to which they take into account interactions between policy instruments   |
| <b>STEP 5</b>                                 | Design and conduct an integrated evaluation (including policy interactions) of policy instruments following the same rationale   |
| <i>Repeat steps 3 to 5 for each rationale</i> |  |
| <b>STEP 6</b>                                 | Integrate rationales' evaluation into a holistic evaluation: evaluation mix.   |

If steps 2-5 are repeated for different rationales then there is a potential step 6, which involves conducting an integrated secondary analysis of the results of the evaluations corresponding to each rationale. The aim of this final phase is to consider also interactions between policy rationales, so as to arrive at an evaluation of the functioning of the policy system as a whole. While the use of a secondary analysis in this phase places limitations on analysis of the interactions between instruments that fall under

different rationales, it is nevertheless an interesting step towards a more complete picture that recognises potential interactions and can feed back into policy learning processes and indeed into future design of individual evaluations of the component instruments. Indeed, a key advantage of this step-by-step evaluation approach is that each step provides a different policy learning output. The learning purpose of evaluation is therefore reached with every step, which facilitates valuable, actionable strategic intelligence to policy-makers throughout the process and not only at the end, as is the case in ex-post evaluations.

#### **IV. THE BASQUE INNOVATION POLICY SYSTEM: EVALUATION CONSIDERATIONS**

In this section we illustrate the evaluation approach formulated in section III with a specific example: the Basque region in Spain. A detailed application of the approach is beyond the scope of this paper, and an issue for future research. Rather, the aim is to concretely illustrate how this step-by-step approach would be applied in practice, so as to demonstrate better its feasibility and clarify what we mean by each of the steps.

The Basque region is located in the south of Europe, on the north coast of Spain and bordering the south-west of France. It is a relatively small region composed of three ‘historical territories’ or provinces, which combined represent around 5.1% of the total Spanish population. The Basque autonomous region enjoys important policy competences, including tax collection and the design and implementation of innovation policies. Indeed, there is no region in the EU that enjoys more political autonomy than the Basque region (Cooke and Morgan, 1998). It is also one of the few European regions that can be considered a true ‘Regional Innovation System’ (Tödtling and Kaufmann, 1999; Cooke et al., 2000; OECD, 2011).

Taking into account this reality, the Basque region is a good example of a complex policy system due to the coexistence in the same region of policies from at least four different administrative levels (European, Spanish, Basque and provincial). Therefore, the multi-level dimension is easily found, in addition to the huge variety of different policies aimed at impacting on innovation activities within the system (policy-mix dimension). These policies respond to a range of different rationales, which include

*developing and supporting STI infrastructures; supporting investment in S&T and innovation; enhancing competencies in firms; strengthening linkages within innovation systems; providing appropriate framework conditions for STI; and developing regional governance capacities* (Magro, 2011; Walendowski *et al.*, 2011). Moreover, policies from different policy domains – innovation, industrial, fiscal, health, education, etc. - are included under these rationales with their corresponding instruments targeted at a range of different actors.

Concretely, the Basque regional government has implemented a wide range of individual policies in different domains that include industrial and cluster policy; science, technology and innovation policy; educational policy; environmental policy; and health policy. These policies are targeted both at firms and at other agents of the Basque innovation system, such as technology centres, universities, hospitals and cooperative research centres. At the provincial level the policy influence is largely in the fiscal policy domain, as it is at this level that tax competencies are located. Indeed, provincial fiscal policies target firms with a range of incentives, including tax reductions for innovation activities. At the national level, it is clear that Spanish innovation policies also impact in the regional policy space in a range of domains, both through policies that are directed at firms and policies targeted at the system's other components such as universities or technology centres, often with the aim of enhancing links between the region and the Spanish innovation system. Finally, the Basque system also benefits from European support programmes in various domains in order to promote science, technology and innovation throughout the system as well as an overall 'knowledge society'.

Responding to a series of distinct policy rationales, we can therefore identify a complex Basque policy system that brings together specific instruments in various policy domains (policy mix dimension) from four distinct administrative levels (multilevel dimension). Table 2 summarises the main elements of this policy system in a matrix of rationales and domains, highlighting the relevant administrative levels at each conjuncture, from which specific policy instruments are targeted at recipients (largely in the form of grants for undertaking activities). This does not purport to represent a complete characterisation of the system that corresponds with the Basque policy space, and indeed the placing of policies from different levels within precise domains and



rationales is a process open to some degree of subjectivity. Our purpose here is to illustrate the possibility of mapping a policy system in line with step one of the protocol proposed in Table 1.<sup>5</sup>

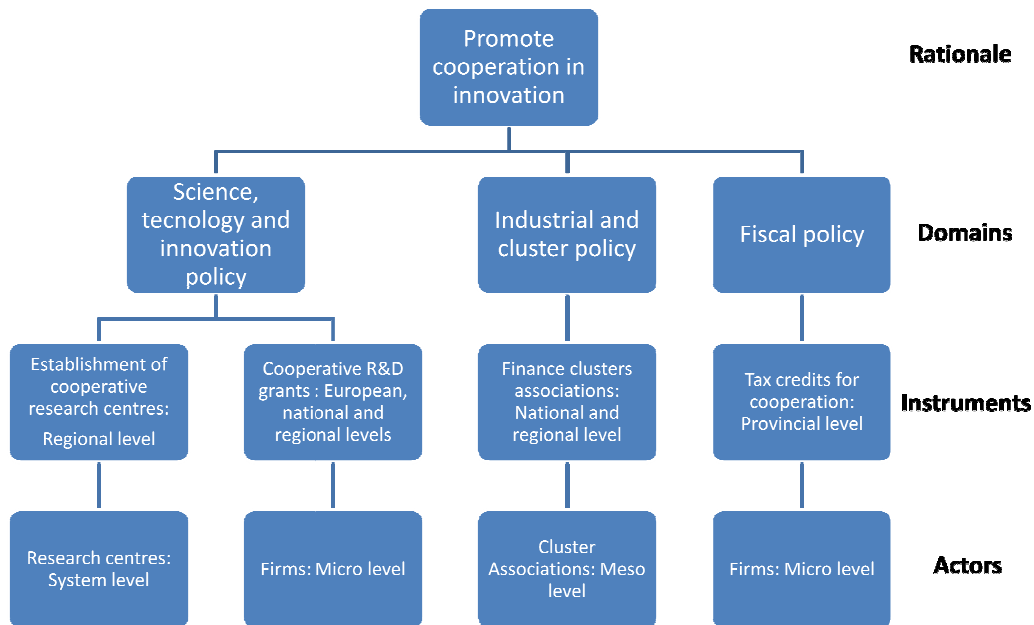
| <b>Policy Domain</b><br><i>Policy Rationale</i>           | <b>Industrial and cluster policy</b>   | <b>Science, technology and innovation policy</b>   | <b>Health policy</b>   | <b>Environmental Policy</b>  | <b>Education Policy</b>  | <b>Fiscal Policy</b>   |
|---|--|--|--|--|--|--|
| <i>Developing and supporting STI infrastructures</i>      |  | <ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> </ul>   |  |  |  |  |
| <i>Supporting investment in S&amp;T and innovation</i>    |  | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> <li>• Provincial</li> </ul> | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> </ul> | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> </ul> |  | <ul style="list-style-type: none"> <li>• Provincial</li> </ul> |
| <i>Enhancing HR competencies in firms</i>                 | <ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> </ul>   |  |  |  | <ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> </ul> |  |
| <i>Strengthening linkages within innovation systems</i>   | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> </ul>                       | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> </ul>                       |  |  |  | <ul style="list-style-type: none"> <li>• Provincial</li> </ul> |
| <i>Providing appropriate framework conditions for STI</i> |  |  |  |  | <ul style="list-style-type: none"> <li>• National</li> <li>• Regional</li> </ul> | <ul style="list-style-type: none"> <li>• Provincial</li> </ul> |
| <i>Development regional governance capacities</i>         | <ul style="list-style-type: none"> <li>• European</li> <li>• National</li> <li>• Regional</li> <li>• Provincial</li> </ul> |  |  |  |  |  |

Given this mix of policies administered from different levels, evaluation is a complex task for this regional policy system. In addition, as the system is composed of multiple actors it is difficult to evaluate the impacts of the policy mix from a holistic perspective with traditional evaluation frameworks. The evaluation protocol is therefore a useful approach for highlighting gaps and overlaps, and moving towards a more integrated evaluation perspective. The second step in the process is to select a rationale and analyse the mix of domains and instruments targeted at different actors underlying this rationale. We illustrate with a precise sub-rationale of the ‘*strengthen linkages within innovation systems*’ rationale, which can be stated as “*promoting cooperation in*

<sup>5</sup> In a thorough application it will be necessary, in particular, to recognise the more detailed sub-rationales that comprise many of the general rationales specified here, and to undertake a series of interviews with policy-makers from each policy domain to assure that as complete as possible a picture is generated.

*innovation activities among firms and other actors within the Basque innovation system and between this system and others (national and European).* This is a rationale mainly based on systemic theories, which seeks to mitigate network problems that might occur in a regional innovation system (Smith, 2000; Edquist, 2001; Malerba, 2010). We identify three different policy domains where policies with this rationale are located: Science, technology and innovation policy; industrial and cluster policy; and fiscal policy. As illustrated in Figure 2, each presents its own set of instruments employed from one or more administrative levels, and directed at different actors.

**Figure 2: Example of a selected rationale in the Basque policy system**



Following the example, innovation policy under this rationale is composed of a set of instruments at European, national and regional level. In the science, technology and innovation policy domain, at regional level we can distinguish between an instrument directed to the establishment of cooperative research centres and another oriented to promote consortia for R&D activities in the form of grants. The former is a system instrument, as its main beneficiaries are the research centres that are created by this policy to strengthen research cooperation in specific fields within the innovation system. The latter subsidises R&D projects carried out by firms in cooperation with other firms or agents (regional, national or European). Indeed, this type of grant is also

implemented and available for Basque firms at the Spanish and European levels, according to the level of networking targeted in the policy.

In the industrial and cluster policy domain, instruments to support cooperation among clusters of firms in specific activities/sectors and/or based on specific complementarities are present at both national and regional level. The regional instrument, however, is by far the dominant one in the Basque policy space. In particular, regional policy supports the establishment and operation of ‘cluster associations’ with annual grants conditional on certain prerequisites and deliverables. Finally, the fiscal policy domain at provincial level includes tax instruments that provide for reductions in corporate taxes for firms that invest in R&D activities, including cooperative activities.

The next step (step 4) in the protocol is to undertake a meta-evaluation or identify and analyse the existing evaluations of those policy instruments identified in step 3. In this case, while it is possible to identify several evaluations of the overall Basque system of innovation and its associated policies (Navarro, 2010; OECD, 2011; Olazarán *et al.*, 2005, 2009; Bilbao-Osorio, 2009),<sup>6</sup> there are few evaluations that have been conducted of the specific instruments related to this rationale. Regarding the instruments belonging to the science, technology and innovation policy, Magro (2011) has conducted an evaluation of cooperative R&D grants directed at Basque firms, taking into account not only the regional level but also the Spanish and European ones. In addition, the Basque Government evaluates the performance of the Cooperative Research Centres, but not from an impact assessment point of view. More evaluation work has been done in terms of cluster policy at regional level, where we can highlight the research of Aranguren *et al.* (2011, 2008) and Aragón *et al.* (2011, 2009), although the interactions with national support for clusters still remain unexplored. Finally, we have not detected any existing evaluations of cooperative results obtained by corporate tax breaks.

In summary, there are both gaps in the instruments that have been evaluated under this rationale and limitations in the existing evaluations in terms of accounting for interactions with other policies from the same and other administrative levels that are seeking the same rationale. In this regard, we can highlight the opportunities that exist

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<sup>6</sup> These evaluations correspond broadly with Arnold’s (2004) notion of a top-down evaluation of the overall health of innovation systems.

in this case in terms of the fifth step in the protocol, which consists of designing and conducting an integrated evaluation of all the instruments identified for this selected rationale. This evaluation should triangulate different methods (quantitative and qualitative methods), adapting existing practices so as to better understand the systemic impacts among the actors targeted with this set of policies. Moreover, successful application of step five for this specific rationale would generate powerful policy learning outcomes, demonstrating the real benefits of this approach to policy-makers. Potentially this would open the way for repeating steps two to five for all of the rationales that have been identified for the Basque policy system. This would not only lead to more sophisticated evaluation practices within each rationale, but also facilitate a secondary analysis to explore interactions between rationales, resulting in a holistic view of the policy system and an appropriate policy evaluation mix.

## **V. CONCLUSIONS: CHALLENGES AND WAYS FORWARD**

In this paper we have built on Flanagan *et al.*'s (2011) insights on the messy, complex and multi-level reality of innovation policies by shifting the focus to evaluation processes as a vehicle to better understand the dynamics of complex policy systems. We first define a policy system as the interplay between two dimensions: the mix of rationales, domains and instruments that make up the universe of innovation policies in a given policy space, and the mix of administrative levels from which these policies originate. This simplification is useful in facilitating a clear depiction of the policy system that impacts in actual policy spaces, for example regions. Indeed, such a demarcation corresponds with the first step in our proposed evaluation mix protocol, which we illustrate with reference to the Basque region in Spain. This framework not only facilitates secondary analysis of already-conducted evaluations, but critically it uses these reflections to guide the development of appropriate primary analysis of programmes in ways that are sympathetic to systemic realities.

While it is impossible to capture in detail all of the possible interactions between innovation policies, we argue that the proposed protocol facilitates the analysis of complexity in a way that emphasises policy learning at each step. In this sense complex innovation policy systems need simple but effective evaluations if they are to be adopted and embraced so as to generate improvements in policy-making. As such, the

proposed evaluation mix protocol brings us a step closer to bridging the significant gap between abstract theoretical analysis of the need to systemically evaluate complex policy interactions, and the ability to do so in practice. Indeed, the illustrative application to the Basque Country policy space highlights the possibilities that can be reaped from more detailed applied research to specific cases using this framework. We suggest that this is an important avenue for future research if policy evaluation practice is to catch up with existing policy complexity, but one that raises a number of challenges.

There is an important issue, for instance, regarding the ownership of evaluation and policy challenges. The inherently multi-level and multi-domain nature of innovation policy implies the need for careful coordination of evaluations if systemic effects are to be effectively considered, yet at the best of times cooperation across government departments and administrative levels is challenging. We have used the regional level to illustrate the protocol because in many countries it is at this level that there is a convergence of a critical mass of innovation policies, which would imply a greater sense of ownership among regional policy-makers for these issues. This is by no means universally true, however, and the approach would need to be adapted to the most appropriate policy space for the case in question. In any case a critical challenge will be how to ensure that the evaluators are able to engage effectively and constructively with policy-makers from different administrative levels that may feel different levels of ownership and commitment. Indeed these challenges would suggest certain benefits from employing external rather than internal evaluators.<sup>7</sup>

Finally we can point to a challenge with regards the critical first step of defining the boundaries of the innovation policy system to be analysed. The very complexity of the mix of rationales, domains and instruments from different administrative levels means that drawing boundaries effectively is extremely difficult. In particular, there is a trade-off between completeness and simplicity which has implications for the subsequent analysis, and which is complicated further by the lack of a clear congruence between innovation theories, rationales and the actual implementation of instruments. There are

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<sup>7</sup> This argument is also in line with Sonnichsen's (1999) analysis of the advantages and disadvantages of different types of evaluator: independence and objectivity as argued to be important advantages for external evaluators, and perceived organisational bias a disadvantage for internal evaluators.

likely to be cases, for example, where policy instruments do not in fact correspond to a clearly defined theoretical rationale, at least in the minds of policy-makers. In practice, therefore, this first step will rely on the interpretations and judgements of the evaluation team, which in turn rests on their capacity to engage with policy-makers in each domain and at each administrative level (for example through interview processes). There is a pressing need here for thorough applied research to test these challenges.

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