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Monitoring the Impact of Science and Evidence on Policy

Authors: Daniel Neicu, Jonathan Cauchi, Jens Otto, Sari Lehto, Jorge Costa Dantas Faria

Key takeaways:

- Science for policy work is part of an ecosystem which includes policymakers and other stakeholders. It is therefore vitally important to envisage the possible effects of one's research on how policy is designed, implemented and evaluated.
- Project planning should include clear actions to achieve and increase the expected policy impact of science by informing on the pathway leading from activities to impact, or by describing how and when policies can be impacted by research.
- To do this, researchers need to understand the policymaking environment they operate in to achieve the impact they seek. With this in mind, this chapter identifies the ways in which the JRC monitors the impact of its activities and learns from this process for the benefit of policymakers and scientists working together at the science–policy interface.



When a research organisation covers a wide range of topics and policy areas, capturing the impact of its activities presents a methodological challenge due to the multitude of different impact pathways which are not always easily traceable. In our experience, this can be overcome by employing a range of tools to measure impact, starting with documenting impact pathways, building impact inventories and case studies and performing portfolio analyses. The main lesson learnt from our experience with these approaches is that achieving impact requires constant interaction with policymakers not only as beneficiaries but also as co-creators of science for policy. Moreover, the desired impact on policy needs to be defined and traced throughout the scientific activity, rather than ex-post. Impact planning is done in the JRC as part of the ex-ante assessment. This creates a culture of sharing knowledge and learning from organisational memory, which enhances the take-up of scientific evidence and its impact on policy in the long run.

What Is Policy Impact and Why Monitor It?

Public research organisations need to demonstrate the impact of their research on policymaking or the society, and thus the value of public investment in research.¹ In the JRC's context, demonstrating policy impact is of paramount importance as it the JRC's mission to support policymaking with sound evidence.

In the scope of this handbook, the policy impact of scientific research refers to how research results influence the way policy is designed, implemented and followed-up. The broader impact evaluation literature often refers to it as 'outcome' or 'intermediate impact' (Joly et al., 2015), whereas impact is usually defined as a long-term effect at a larger scale, such as the economy or society. Policy impact is a process rather than a result, and it varies considerably across scientific fields, policy areas and environments.

However, besides accountability considerations, impact evaluation also promotes learning among researchers about the process of achieving impact (Bell et al., 2011), and leads to a better understanding of the relevance and importance of their work. Understanding the needs of both policymakers and scientists and finding a common denominator for the two is paramount to fostering an evidence-based policy environment and mitigating the 'two communities problem' – the view that scientists and policymakers live in separate worlds with different values, which results in a limited use of scientific evidence in policymaking (Caplan, 1979). Monitoring the pathways of impact from lab to plenary helps researchers understand where the critical points are and how to address them in their interaction with policymakers. This also serves the purpose of creating working relationships between the two sides. As discussed in most chapters of this handbook, close relationships and mutual understanding of the scientific evidence and the policy needs are paramount to co-creating the right research for evidence-based political decision-making. Moreover, regularly assessing policy impact helps create a culture of knowledge exchange where strengths can be replicated throughout the organisation.

Researchers should read this chapter both as a reminder that scientific advice for policymakers has to be designed in such a way as to have maximum impact and as a way to understand what the stages of achieving impact on policy are and where improvements can be made in

¹The Research Excellence Framework (REF) in the United Kingdom is an example of a system for assessing the quality of research in higher education institutions.



their interaction with policymakers. There are significant parallels (including monitoring and learning) amongst the various impact assessment sources related to international development,² but the focus of this chapter is on the JRC as a public research organisation.

Overview of Monitoring Tools and Their Use

For public research organisations that collaborate closely with policymakers, there are ample opportunities to impact policies. The challenge is how to demonstrate it. Especially in a large research organisation spanning a wide spectrum of policy domains, impact pathways are very diverse. In some cases, evidence of research being used in the policy process is found in legal documents. In others, indirect evidence is required from other sources (policymakers, briefings, speeches, minutes of meetings, public fora or the media). However, the multitude of sources of scientific evidence used in policymaking can create attribution issues, in that it becomes difficult to track how research results are taken-up. Another complication is related to the time passed from when results are provided as input in the policy process and its final stages. Most of the time, and especially true for policy formulation, impact is only apparent once the policy process has reached its end. Complex policymaking environments can also complicate impact monitoring, usually by aggravating both timing and attribution issues.

More and more researchers close to the policy environment are following a codesign strategy, meaning that research projects are codesigned with policy stakeholders and beneficiaries. This implies that the role of research in policymaking changes from a research–results–deliverables style to a more interactive relationship. This also translates into a stronger role for researchers in engaging with partners throughout the policy process.

Another issue with evaluating impact on policy is quantification. Measuring the scale or importance of impact is relevant for accountability and benchmarking across organisations, but the scale of impact can vary considerably.

To capture the impact of science on policymaking thus calls for a wide range of tools. Based on our experience, the most important ones are documenting impact pathways, building impact inventories, recording case studies and performing portfolio analyses of research projects. Fig. 1 illustrates these impact evaluation tools and their interdependencies. Although several approaches are plausible, recording a number of case studies allows drawing comprehensive impact pathways. These then help to build an impact inventory by defining what activities can lead to which outputs and types of policy impacts. Finally, the inventory can be used to select related activities and impacts and analyse the portfolio in a given research or policy area. The

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²These include the World Bank and the Overseas Development Institute (ODI) amongst others.

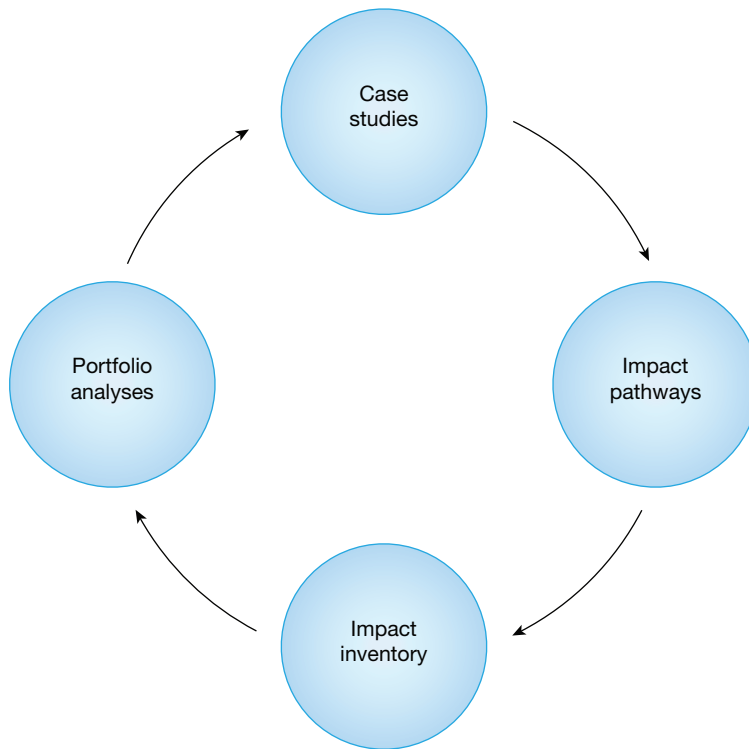


FIGURE 1 The impact evaluation cycle.

feedback loop is closed when portfolio analyses discover gaps to be addressed by analysing new case studies of an organisation's research activity.

Following this, [Fig. 2](#) illustrates how different methods for impact evaluation and monitoring address the challenges of tracing policy impact and how they are affected by them.³ The timing dimension refers to the time it takes for scientific activities to achieve policy impact. For example, impact pathway mapping can deal with longer time scales because the method links activities to outputs and then to impact irrespective of the time scales, whereas impact inventories are usually connected to reporting deadlines. On the other hand, quantification refers to the possibility to use indicators to objectively measure the scale of impact at an aggregated level (e.g., at organisation level). Although some case study-based methodologies do quantify impact, these usually involve subjective appreciations transformed to scales ([Joly et al., 2015](#)).

Case Studies

Case studies aim to answer a set of evaluation questions. While, for example, an impact inventory is useful for capturing large numbers and varieties of isolated instances of impact

³This is restricted to the evaluation of research in the specific fields that the JRC is involved in.



	Timing	Complexity	Attribution	Quantification
Case study	+	+	+	—
Impact pathway mapping	+	+	+	—
Impact inventory	—	—	—	+
Portfolio analysis	—	+	—	+

FIGURE 2 Impact monitoring tools and the challenges they address.

Box 1: How case studies promote organisational learning

Following consecutive recommendations from external evaluations of the Framework Programmes for Research and Innovation to better explain our impact, the Joint Research Centre has been regularly carrying out case studies and portfolio analyses. In order to assess our longer-term impact, we have worked with a number of external experts to select and analyse a series of case studies which, by themselves or by the portfolio they represent, span more than 10 years (three consecutive Framework Programmes). All types of impact were considered, and the cases were selected for their maturity, representativeness of impact and of activities. This kind of study allows analysing cases in which the R&D phase may be rather long, in which impact takes significant time to materialise, or in which specific individual cases of impact need time to accumulate to allow for a meaningful assessment. Working with external experts has a cost in terms of the process, but also clear benefits in terms of expert judgement, independence and credibility. In this particular case, the experts recommended to use such impact evaluations and cost-benefit analyses more systematically.

and for performing statistical analyses assisting management decisions, it lacks information of the magnitude of the impact a particular activity generates. Here, case studies bring a more balanced and deeper analysis, in particular because they aggregate impacts around a certain type of activity or body of legislation, and over a number of years.⁴ They are also better suited for external evaluations by peer panels, although these come at a higher cost (Hill, 2016).

There have been recent attempts towards standardising information in case studies, based on methodologies such as the Socio-economic Analysis of Impacts of Public Agronomic Research – ASIRPA (Joly et al., 2015). However, as the number of research areas increases, so does the cost of developing comprehensive case studies. Moreover, the possibility of standardising case studies over various research areas is offset by the need for detailed information (Box 1).

⁴See also Gaunand et al. (2017).



Impact Pathways

An impact pathway is a method tracing the consecutive steps between activity and impact. Documenting impact pathways can be challenging due to the breadth of an organisation's portfolio of activities and beneficiaries, and its involvement in different phases of the policy cycle. An additional challenge is the lack of standardised referencing of scientific research in policy documents, which makes it difficult to trace contributions in an automated way (Topp et al., 2018).

In some cases, the impact pathway is relatively straightforward when there is a specific request from policymakers to provide evidence for an agreed item on the legislative agenda. For example, during the policy preparation stage, policymakers may request researchers to model different policy options to be considered. One may then perform quantitative modelling of different options, or sensitivity analyses to establish the range of key parameters affecting the expected impact of the policy on society. The outcome of research usually manifests in this case as a set of policy options for policymakers, who will decide which one suits the needs that the policy addresses. The impact of research will thus be to refine the choice of policy options, or to provide evidence that helps policymakers choose the most suitable one. The attribution of impact may not be straightforward if, as in most cases, one can only provide part of the scientific evidence for the policy. As other chapters in this handbook note, strong interaction with policymakers leads to better-informed scientific work and policy development.

Another example is contributing to policy implementation, such as providing technical guidelines for European Union countries, monitoring the variables to be influenced by policy decisions (e.g., CO₂ emissions) or coordinating networks for the purpose of harmonisation and standardisation. In its remit, research can provide the tools and methods, as well as specific analyses for policy evaluation. In such cases, the impact pathway is fairly easy to trace if researchers act on an exclusive and specific mandate (Box 2). Other times, when researchers may be working with intermediaries or when there are many factors influencing a policy outcome, it is less clear how outcomes (e.g., implementation of smart specialisation or macroregional strategies) have an impact on policy implementation. For this reason, among others, there is a need to use complementary methods to capture impact, as was illustrated in Fig. 2.



An impact pathway is a method tracing the consecutive steps between activity and impact



Box 2: The INSPIRE Directive – an example of impact pathway analysis

The INSPIRE Directive (2007/2/EC) is one of the key pieces of legislation in European environmental policies. It provides the framework to collect, harmonise, organise the dissemination and use of spatial information in the European Union. Its origin goes back to the early 1990s, when public and private services started to use Geographic Information Systems (GIS). This opened up great possibilities to combine geographical data and maps into Spatial Data Infrastructures for urban planning, resource management, environmental impact assessment, location planning or crisis interventions. However, the lack of industry standards created problems with the quality, organisation, accessibility and sharing of the data. As Earth observation satellites created a rapid increase of geospatial data and digital maps, the European Commission launched the development of a policy framework for Geographic Information in Europe in the mid-1990s.



Box 2: The INSPIRE Directive – an example of impact pathway analysis—cont'd

Role of the JRC and stakeholders

We were one of the early adopters of GIS satellite technology for earth observations and, based on our original mandate, for data harmonisation and validation. This technical competence, the position independent from special interests and networking with both research experts and national authorities, has led us to receive the mandate for the development of the Implementing Rules and the European Geoportal. We also followed developments and participate in the technical coordination with other international standardisation bodies.

The development of the INSPIRE Implementing Rules requires coordinating the work of hundreds of experts from European countries to ensure that the technical specifications are not only technically sound but also organisationally and financially feasible.

Output

The main output of our activity are the Implementing Rules proposed for the INSPIRE Directive.

Policy impact

The impact that our activity has on this policy is the take-up of technical specifications as Implementing Rules for the INSPIRE Directive and subsequent harmonisation of the geographical data.

The path from activity to impact described above is illustrated in [Fig. 3](#).

Lesson learnt

This case is a prime example of how advanced scientific and networking capacity helps achieving policy impact. Our reputation allowed us to engage with a large number of policymakers, industry stakeholders and researchers. Combined with our position close to policymakers, it made us very successful as knowledge brokers.

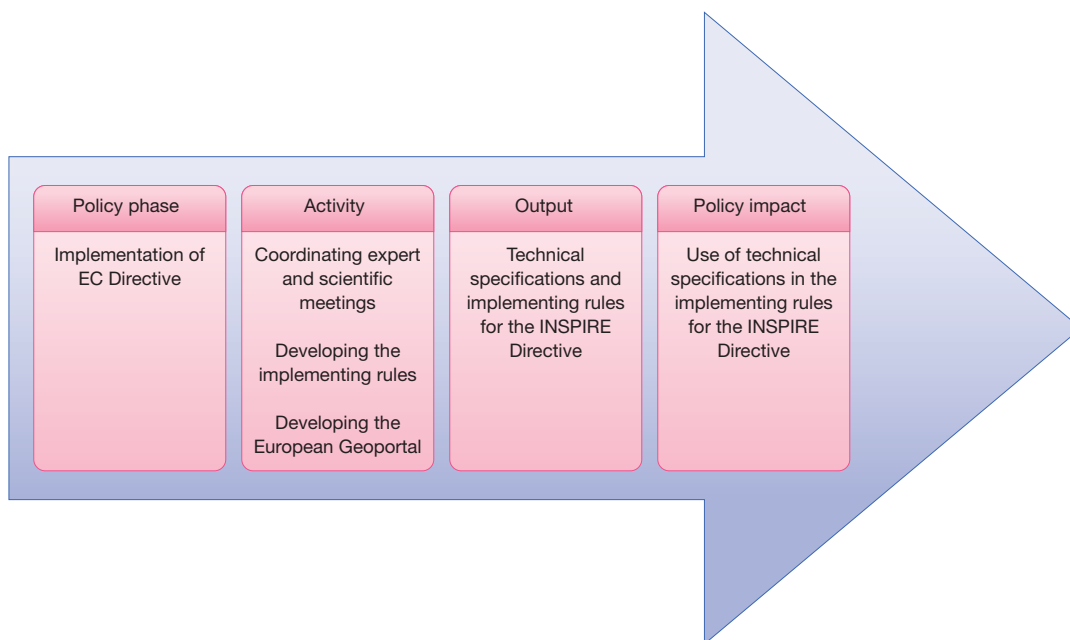


FIGURE 3 Example of a simplified policy impact pathway – the INSPIRE Directive.



Impact Inventories

An impact inventory comprises cases of policy impact reported by researchers (i.e., it is a self-assessment). It is an easy quantitative tool used to monitor impact on policy. Due to the difficulties with establishing a traceable causality, one often needs to focus on tangible impact, i.e., documented instances in which research results have been used in policymaking. In addition, researchers should explain in such exercise what is the nature and the level of their involvement in the policymaking process, including how they interact with stakeholders. In our case, these instances are tracked, recorded by the research teams and validated by internal peer review. The result is an inventory of impact cases that can be examined for patterns, drawing the organisation's impact profile. The inventory can provide statistical support to management decisions regarding research or customer portfolios, areas of improvement of scientific services and gap analyses, targeting specific beneficiaries, or improving links to political priorities.

The challenges of such a bottom-up process revolve around consistency issues. For example, due to a large number of reporters and validators and the breadth of portfolio activities, the scale of impact can vary considerably. Moreover, external validation, e.g., by end users, is difficult to achieve because of the large number and variety of impacts – in our case, we count, on average, over 350 cases of impact on policy each year (Box 3).

Maintaining an inventory of policy impact helps organisational learning in a number of different ways. First, it allows researchers to analyse the characteristics of successful activities which lead to impact. Then, the inventory can show what needs to be improved to increase the impact on policy. For example, one can analyse the reasons for rejecting impact claims made by scientific teams. This analysis sometimes contrasts with what researchers think their results are and how they are used by policymakers. The information can help focus researchers at the science–policy frontier on the fact that their science needs to respond to policy needs.

The organisation can track through the inventory the policy areas and stages where it has most impact. For example, Fig. 4 illustrates our impact profile in 2018, when we have had most impact on the implementation and monitoring of European policy. The following main groups of impact were policy formulation, agenda setting, evaluation and policy adoption. Such analyses can allow management to follow whether the organisation is on track in following its strategy or whether it needs adjustments in terms of the policy areas it covers.

These examples showcase the power of analysis residing in impact inventories. Yearly reports are disseminated to all colleagues. They help management to make informed decisions not only about the strategic orientation of the organisation but also about any operational changes needed to achieve strategic goals. Moreover, performance indicators based on such inventory support the organisation to show accountability for its resources in annual activity reviews and other documents required by decision-makers. And finally, they are an important feedback tool for researchers working at the science–policy interface, where showing impact on policy is required.



Box 3: Impact inventory

The JRC impact inventory contains individual impact claims made by our researchers each year. The process starts when a researcher (or a team) registers the impact of their work on a specific policy in a specialised IT system. This is then followed by reviews from hierarchy, and finally by a peer panel composed of staff from across our research centre.

The role of knowledge management is very important in this process. It needs to be able to broker the transfer of knowledge across the organisation and make the entire review process consistent. Knowledge management teams do so by ensuring that very specialised scientific information is translated in a way that can be easily interpreted by peers in their review.

To assist in clarifying the definitions and boundaries between what constitutes an output, an outcome and an impact, regular workshops are held across the JRC. Researchers are encouraged to think critically about how their intended stakeholders use their outputs, the short- and long-term consequences and the expected pathways. Guidelines are produced to communicate the best practices and examples to avoid common pitfalls when describing impacts. An internal forum is also maintained to encourage ongoing discussions on these matters.

Researchers should be very concise in describing the impact that their work has on policy. The high number of impacts recorded in the inventory requires a significant amount of time to evaluate; thus, information needs to be clear and concise to show how scientific activity impacted policy. The usual information that researchers need to record includes the description of scientific activities, of the interaction with stakeholders and of how their results affected the policy.

For analytical purposes, other information regarding the research and its output may be collected from project management platforms. Automation of such information collection ensures that scientists only need to focus on describing the impact they have on policy.

The inventory is essentially a database containing codified activities, outputs, beneficiaries and impacts. It can be analysed at different levels and for different needs. The inventory allows to analyse our overall impact either on specific policy priorities, by categories of research activity, or by policy area, among others. This makes it a versatile tool to quantify and analyse an organisation's impact profile.



Portfolio analyses help assess whether the organisation's activities match its strategic goals.



Portfolio Analyses

Research portfolios are mostly used to manage private R&D projects, but they have also been taken-up by public research organisations as a way to manage and analyse subsets of research activities (Wallace and Rafols, 2015).

Portfolio analyses help assess whether the organisation's activities match its strategic goals, and they typically include benchmark-

ing. They also help prioritisation, identifying gaps and redundancies. The term has been widely used in corporate finance to describe methods to manage portfolios of securities (Sharpe, 1963). Public research organisations use portfolio analyses to develop their strategy and analyse the cumulative impact of their projects (Bozeman and Rogers, 2001).

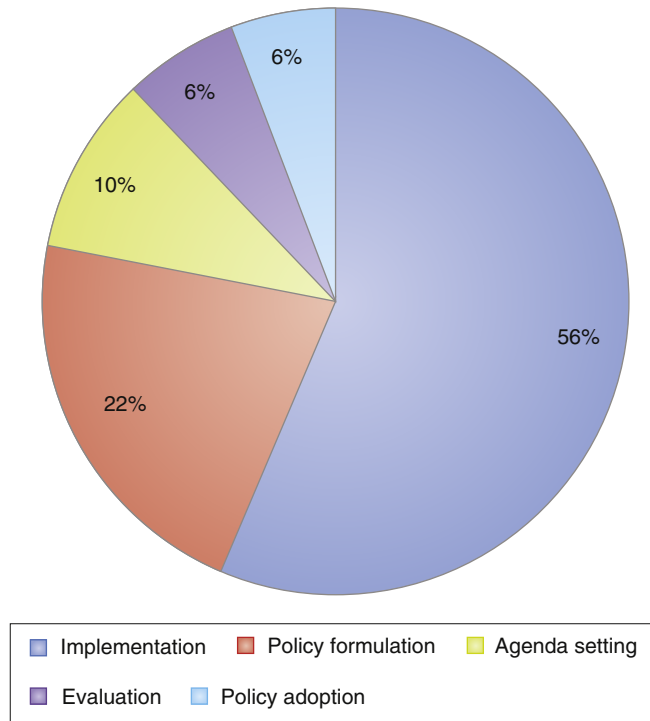


FIGURE 4 Share of JRC policy impacts in 2018 by impact category.

In general, these analyses are more relevant for the management of research organisations than for the researchers themselves, although important synergies between different activities can be proposed to scientific teams. Information about the broader context in which one's research is performed can help scientists understand how different activities can be connected to achieve impact. Using a formal intervention logic backed by portfolio analyses can enable the organisation to base its strategic and operational decision-making on a chain of expected effects (i.e., activities–outputs–outcomes–impacts). This might be further strengthened through the establishment of a priority-setting mechanism to support its development. A recent example of a portfolio analysis is an evaluation of our modelling support for the European Commission's policy impact assessments ([European Commission, 2017](#)) ([Box 4](#)).

There are a number of ways researchers can benefit from portfolio analyses. First, they can benefit from organisation-wide economies of scale. In the example above, we show how one type of portfolio – output portfolio⁵ – can cover a very wide range of scientific activities and fields. The outputs of research are used in one type of policy document – impact assessment – which has a determined structure and research questions. This creates

⁵An output portfolio is one that is built on a type of scientific output, rather than similar activities or impacts (Bozeman and Rogers, 2001).



Box 4: Example of a portfolio analysis

In 2017, the JRC has performed an analysis of the portfolio of modelling techniques that had been used in the impact assessments of European policies. In a nutshell, impact assessments are carried out by the European Commission while preparing new policy initiatives expected to have significant economic, social or environmental impacts. We usually have a large role, especially in quantifying such impacts.

The analysis was performed on 512 impact assessments for Commission initiatives between 2009 and 2014. Starting from information collected from case studies and impact inventories, corroborated with an analysis of the policy documents, we have found that we had contributed with models to 48% of the impact assessments. The organisation's most used tools were energy models, followed by environmental models, microeconomic models for financial markets, transport and agriculture models, respectively.

This analysis provided a quantification of our modelling work and our impact by type of policy or beneficiaries and stakeholders. This quantification was then used to report to management on various issues, from the coverage of policy priorities to the effectiveness of the organisation's modelling activities in achieving policy impact.

the means for an organisation to reduce the cost of performing research in different areas by standardising its input into the science-for-policy process.

Then, portfolio analyses can help scientists to understand better the needs of the beneficiaries of their research. Research for policy is meant to support goals that are exogenous to science itself (Sarewitz and Pielke, 2007), and no one scientist or team of scientists can have a large impact by itself. Positioning oneself within an organisation's portfolio of research projects provides knowledge externalities that individual scientists or teams can use to improve their chances of having an impact on policymaking, as well as possibly improving their scientific knowledge.

Conclusion

The evaluation practices are evolving to respond to the growing demand to demonstrate the added value and impact of scientific work. We have shown in this chapter that one method alone is insufficient to capture the entire array of impact that a complex research organisation has on policymaking. Each of the tools described here has its strengths and weaknesses, and it is only by using them collectively that the organisation can learn and create the knowledge needed to improve. To be able to reap full benefits of impact evaluation, this set of basic tools will need to be extended to capture more diverse effects of scientific results on public debate and political behaviour, to include methods to weight impact, to capture customer feedback and modern alternative metrics information to better connect the different measurement methodologies and to better account for longer-term effects. These additions are necessary in a dynamic scientific and policy environment, where researchers find themselves at the science-policy frontier, needing to show how they can affect policymaking in an almost business-like way in which science becomes a service. In this sense, impact on policy needs not be thought of as a post-factum activity, but rather as one that needs to be proactively addressed even before research begins.



The key takeaway for researchers is that scientific work is part of an ecosystem which includes policymakers. It is thus paramount to imagine the possible effects of one's research on how policy is designed, implemented or evaluated, as this provides accountability for the public funds spent on research. To foster a 'think impact' mindset, project planning needs to include clear actions to achieving the expected policy impact. This exercise also offers insights on how to increase the policy impact of science, whether by informing on the pathway leading from activities to impact or by describing how and when policies can be impacted by research. Oftentimes, these paths are indirect, and researchers need to understand the policymaking environment they operate in to achieve the impact they seek. As Sarewitz and Pielke (2007: p.5) assert, "'better" science portfolios [...] would be achieved if science policy decisions reflected knowledge about the supply of science, the demand for science, and the relationship between the two'.

Our experience and the analysis of the impact of our activities have given ample proof of the importance of working together with policymakers. The activities that are rated high in this respect have close contact with the demand side and often have a clear policy mandate. It is also important to note that many forward-looking, top-rated research activities have evolved to generate European-added value in the long run and uptake in the policy process, emphasising the importance of our role as an independent research body. This can be a lesson that we pass on to others at the science-policy interface, in an ever-changing environment that constantly brings with it new challenges.