An evaluation framework for institutional capacity of science-for-policy ecosystems in EU Member States

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An evaluation framework for institutional capacity of science-for-policy ecosystems in EU Member States

Expert report series: Developing an evaluation framework for science-for-policy ecosystems

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Krieger, K. (editor)
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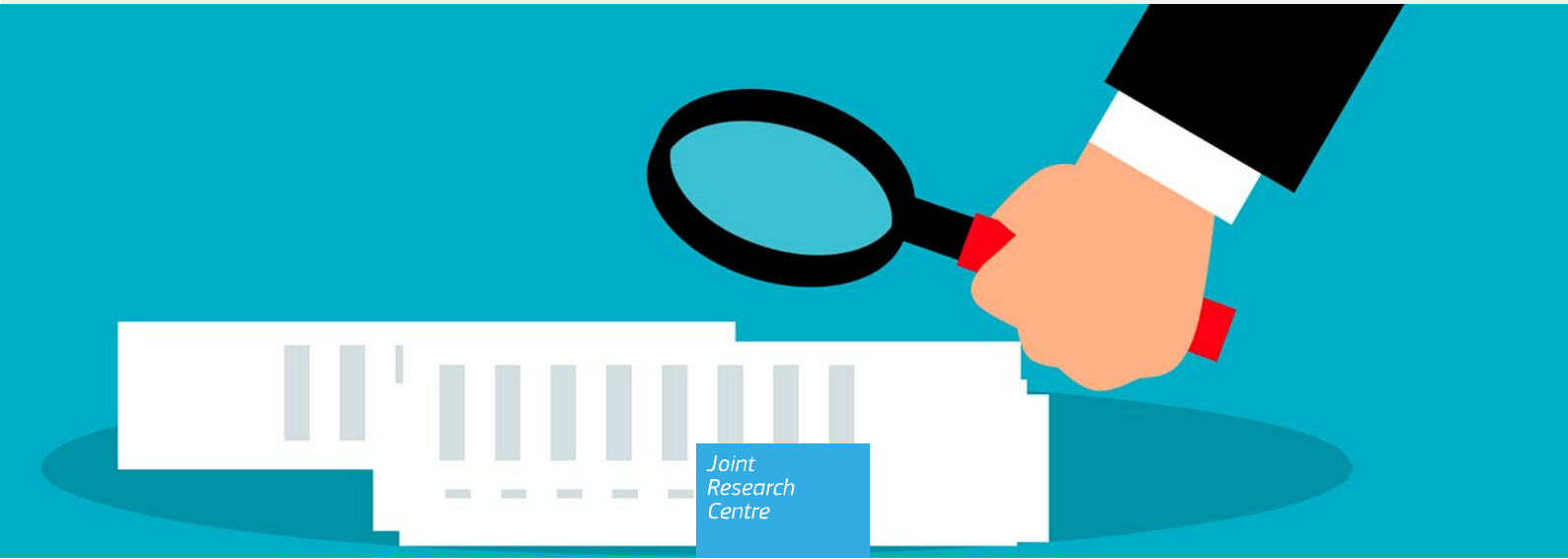

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Contents

Abstract

This report sets out an evaluation framework to assess the institutional capacity of science-for-policy ecosystems across EU Member States. Specifically, this framework can be used as a relevant tool to understand the variety of productive interactions between evidence providers and policymakers, since a high frequency of productive and dynamic interactions between evidence providers and policymakers is seen as central to a healthy ecosystem. The report is of interest to practitioners and expert evaluators who want to assess how different organisations and actors provide and transmit knowledge individually and jointly to support evidence-informed policymaking. The guidebook includes concrete and actionable guidelines for evaluators to organise any national assessment, through a series of indicators to measure a variety of interactions: direct, indirect, financial, staff, and basic principles to address the degree of openness, transparency, and collaboration. Using this evaluation framework will give governments and stakeholders a better understanding of what a healthy ecosystem looks like and how to improve systemic integration and learning.

Foreword

In line with its role as the European Commission's science and knowledge service in support of EU policymaking, the Joint Research Centre (JRC) has launched several activities that aim at strengthening and connecting science-for-policy ecosystems within EU Member States. As policy issues become increasingly complex and interconnected and politics ever more polarised, robust institutions that ensure that scientific knowledge is mobilised, synthesised, translated for, and integrated into the policymaking process become increasingly relevant.

In this work, the JRC benefits from the input provided by professionals working about and/or at the science-policy interface across Europe, from public servants in ministries, government agencies, Parliaments, and government research funding bodies to staff of public and private research institutes, universities, national academies, learned societies, research councils, think tanks, committees, scientific networks, and publishing houses. Through surveys, commissioned studies, and participatory workshops, the JRC seeks to stimulate a vibrant debate about structures, networks, processes, and practices underpinning evidence-informed policymaking across Europe.

To inform and structure the debates about capacity building in support of robust, interconnected science for policy ecosystems, one strand of this work focuses on developing, together with an interdisciplinary group of experts and practitioners, a self-assessment framework for the institutional capacity of such ecosystems. Through a combination of commissioned studies, participatory events, and pilot studies, the JRC aims to provide a playbook that supports policymakers and other stakeholders at the science-policy interface in designing an evaluation process for the institutional ecosystem that connects scientific research with policymaking processes.

To date, three commissioned studies have been published to set the basis of an assessment exercise of science-for-policy ecosystems: (Oliver 2022; Niestroy 2022, Strand 2022). The current external expert report is an additional step into producing such a playbook for evaluating the quality and efficiency of the interactivity between public administrations and the research and innovation systems.

The project is developed in close coordination with the work undertaken by an expert group of the European Commission's Directorate General for Structural Reform Support (DG REFORM), which has resulted in two publications: Mackie I *et al*. (forthcoming): *Evidence-informed policymaking – Framing, assessing and strengthening EIPM ecosystems*; and European Commission, Directorate-General for Structural Reform Support, Mackie, I., *et al* (2022).

Following these reports, we will continue improving the process. We welcome any feedback that you can share via JRC-E4P-ECOSYSTEM@ec.europa.eu.

Kristian Krieger & Lorenzo Melchor

November 2023

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Editors

Kristian Krieger, PhD and **Lorenzo Melchor, PhD** both work as policy analysts at the Science for democracy and evidence-informed policymaking Unit of the European Commission's Joint Research Centre (JRC). They are responsible for the analysis and capacity building of the institutional foundations of evidence-informed policymaking. They jointly lead and manage the JRC projects on "Strengthening and connecting ecosystems of science for policy across Europe" and "Developing an evaluation framework for science-for-policy ecosystems", under which framework this current expert report has been developed.

Executive Summary

This report sets out an evaluation framework to assess the institutional capacity of science-for-policy ecosystems across EU Member States. The report is of interest to practitioners and expert evaluators who want to assess how different organisations and actors provide and transmit knowledge individually and jointly to support evidence-informed policymaking. Using this evaluation framework will give governments and stakeholders a better understanding of what a healthy ecosystem looks like and how to improve systemic integration and learning.

Indicators and principles of systemic health is defined in detail in the report. They include a checklist of five foundational principles to ensure the legitimacy and efficiency of the ecosystem, expressed by independence, transparency, responsibility, accountability, and respect for diversity.

Furthermore, the evaluation framework includes concrete and actionable guidelines for evaluators to organise any national assessment. Central to a healthy ecosystem is a high frequency of productive and dynamic interactions between evidence providers and policymakers captured by the following indicators:

1. **Direct interactions** (face-to-face interactions with policymakers, researchers participating in expert advisory panels, experts serving on government commissions, presentations for policy audiences, co-creation events and meetings etc.)
2. **Indirect interactions** (digital and material interactions with policymakers, policy reports, statements, papers, and briefings produced and published, datasets accessed by policymakers, websites, and digital platforms etc.).
3. **Financial interactions** (funding and grants for science-for-policy initiatives, support for policy fellowships, support for joint events and platforms, special calls for projects and programmes to support evidence-informed policy etc.).
4. **Staff interactions** (government appointed scientists, joint appointments of staff, recruitment of policymakers to serve on scientific advisory institutions, staff mobility programmes, exchange programmes etc.)
5. **Degree of openness, transparency, and collaboration** (public availability of evidence reports and advisory statements, declarations of conflict of interests, code of conducts, joint programmes or project with other key evidence providers, citizens, and stakeholders etc.).

The proposed indicators and guidelines are designed to identify opportunities for support, intervention, and more strategic use of resources to improve the circulation and augmentation of evidence in policy. High-quality evidence is the bedrock of good scientific advice, yet it cannot stand alone. High-quality interactions are equally important to ensure that evidence is collected and used to generate positive societal change. For these reasons, an evaluation framework for assessing science-for-policy ecosystems needs to be focused on the dynamic and fluid interplay between actors and institutions. Ultimately, what counts as relevant and valid evidence is the result of closely interlinked processes of translation and augmentation within the ecosystem.

1 Introduction and context

This report presents guiding principles for analysing and evaluating the institutional capacity of science-for-policy ecosystems in European Union (EU) Member States. The aim of the report is to provide an evaluation guidebook that can be used to assess the science-for-policy ecosystem at the national level. By presenting a mix of qualitative and quantitative methods, the report is designed to help policymakers and experts to assess the institutional capacity of the national ecosystem. For this purpose, the report describes how a good process for evaluation can be organised at Member State level along with functional requirements and principles that evaluations could include.

In the years 2020-2022 the European Commission's Joint Research Centre (JRC) undertook an extensive exercise to create a pan-European dialogue on national ecosystems of science for policy. **A national ecosystem of science for policy consists of an interlinked set of institutions, structures, mechanisms, and functions that interact at different levels to provide scientific evidence for policy** (European Commission 2022, Oliver 2022, Pedersen & Hvidtfeldt 2021). To better understand the national advisory ecosystems as well as the European Union's support for mobilising knowledge in policymaking, the JRC launched the project "Strengthening and connecting ecosystems of science for policy across Europe".

A vital component of this project consisted of a workshop series based on country studies of national science-for-policy ecosystems, [(1)] as well as conceptual contributions published in a series of reflection papers (Oliver 2022, Niestroy 2022, Strand 2022. Through the workshops, the JRC established an extensive dialogue with Member States in which representatives of governments, public authorities, academia, and advisory bodies provided input and information about their country's science advisory mechanisms.

The dialogue demonstrated how Member States use a wide range of structures and instruments to provide evidence and advice to policymakers, often connected through a complex set of institutions. To mention a few, the workshops featured examples of the role of chief scientific advisers, scientific councils for government, science advisers in national ministries, government planning and analysis units, applied research units, parliamentary offices of science and technology, public research institutes, universities, national academies, regional science-for-policy mechanisms, and other knowledge brokering mechanisms and institutions.

The workshops explored how scientific evidence is provided to policymakers by various institutions. However, the workshops also demonstrated that these institutions are part of a complex interplay, which rarely is known, nor is evaluated or assessed. Whereas individual scientific advisory bodies are relatively straightforward to assess, the **connectivity, coordination and learning** of the ecosystem is more complex to evaluate. At the same time, recent global events have made it clear that bodies operating on the science-for-policy interface need to respond to boundary-spanning policy problems. Overcoming administrative and disciplinary silos is necessary to achieve an integrated advisory ecosystem and a whole-of-government approach.

With the emergence of multiple, entangled policy crises, such as pandemics, climate change, energy transition, and geopolitical security, it has become clear that policymakers need access to a wide set of advisory institutions. At the same time, these institutions do not work in isolation but need to coordinate and collaborate with each other and with the wider policy ecosystem. This guidebook provides measures and principles for how to assess the dynamic interplay between science and policy in the ecosystem.

The present report is the outcome of desk research, a review of available documents, and expert contributions. It presents inspiration to EU Member States and the wider science policy community to undertake an evaluation process of the structures, processes and frameworks that underpin the use of scientific evidence in policymaking. In doing so the document relates to other important European initiatives to improve the integration of evidence in policymaking, most notably the Commission Staff Working Document SWD (2022)346 final (European Commission, 2022) and the ongoing EU ministerial debates. [(2)] In this capacity, this report should be used to facilitate discussions within the Member States and help connect ecosystems and their communities across borders.

[1] See discussion papers produced for Denmark, Portugal, Greece, France and Spain: https://europa.eu/!VyqcQj.

[2] See also https://europa.eu/!4tCcg9 and ongoing discussions on the subject during the Spanish Presidency on the Council of the European Union that may ultimately lead to Council Conclusions.

1.1 Use of evidence in policy: definitions and challenges

This report presents a self-assessment tool that should help manage and inform assessment exercises in individual EU Member States. The report primarily takes the perspective of the policymaker or evaluator tasked with assessing the health of the national science-for-policy ecosystem. For professionals in this role, the document can help guide and inform evaluations of the institutions, mechanisms, roles, and structures that public administrations have at their disposal to facilitate **the generation of evidence and its circulation and translation in policymaking**.

Given the diverse traditions, cultures, and values embedded in the different administrative systems across Member States, the proposed framework is based on the premise that there is no one-size-fits-all approach to evidence-informed policymaking (Gluckman 2013). The framework and guiding principles should be considered as a template for further reflection and learning.

Across the EU, there is a broad consensus that the organised and institutionalised exchange of research-informed knowledge to inform policy institutions is a key resource for policymakers when forming opinions and shaping actions. Research, science, technology, and innovation play an essential role in identifying, evaluating, and communicating risks and maximizing opportunities for governments to advance democracy and welfare. Within this conversation, there is a growing recognition of the critical need to be rigorous both in the employment of evidence in policy and in the impact assessment and evaluation and of policy design and implementation.

At the same time, there is a recognition that science and policy are largely distinct cultures: the nature of their interaction is influenced by context and history and by the "social contract" between science and society, which has developed over decades (European Commission, Directorate-General for Structural Reform Support, Mackie, I., *et al* 2022). To create effective links between science and policy, both governments and research communities have created special mechanisms for knowledge mobilisation and brokerage. Rather than individual institutions, the production and exchange of evidence takes place across a continuum of bodies and mechanisms. Possible elements of the science-for-policy ecosystem include:

- Individual academics, universities, research institutes;
- Academic societies and professional bodies;
- Government employed scientists;
- Scientists within policy agencies;
- Scientists within regulatory agencies;
- Units, teams, and specific positions in government;
- Government advisory boards/science councils/commissions;
- Science advisers to executive of government; and
- Parliamentary libraries, parliamentary science and technology units.

The nature of these organisations is variable and evolving, and the impact of their interactions with policymakers is often complex and non-linear. In most cases, the transmission and coordination of research-based evidence for policy do not follow strict protocols (Pedersen & Hvidtfeldt 2021). Circulation and augmentation of scientific evidence for policy is contextual, sometimes ad hoc, based on networks and informal knowledge sharing, or codified by official mandates and instructions. In some cases, the ecosystem works as an integrated system of components. In other cases, fragmentation prevails with overlapping or even competing providers of evidence for policy caused by the distance between policy sectors and academic disciplines.

The academic literature on the use of science for policy does not provide any univocal recommendations for how to evaluate advisory institutions and the interplay between them (Lentsch & Weingart 2011, Boaz *et al*. 2019). To name just a few of the most commonly referred challenges:

- too many advisory institutions work within disciplinary silos;
- there is an over-emphasis on the provision of research and evidence and a lack of absorptive capacity among governments;
- most scientific research is incomplete and ambiguous at the time when policy action is needed;

— scientists and policymakers work with different perceptions of risk and feasibility; and

— that evidence may be contested across different disciplines or interpretations.

Ideally, an assessment framework for evaluating science-for-policy ecosystems should address both the performance of individual institutions and the overall system capacity. By adopting the metaphor of an ecosystem, it becomes relevant to adopt an evaluation framework that identifies and assesses individual system **components** as well as **system linkages** in the science and policy environment (Rapport *et al.* 1998). This is the starting point for this guidebook. Assessing individual advisory institutions as well as the links between them will yield valuable knowledge and inform policy debates about the overall health of the ecosystem, potentials for improvements, and opportunities for capacity-building and reform.

1.2 Individual institutions versus ecosystem capacity

In order to provide common solutions to cross-cutting problems, this guidebook suggests an evaluation framework based on a system-wide understanding of science-for-policy activities. Rather than focusing on the performance of individual advisory mechanisms or structures, the guidebook encourages evaluators to look for interlinkages and patterns of communication and learning across the ecosystem.

A healthy ecosystem is one in which the individual components interact in a dynamic, coordinated, and effective way, so that evidence is provided in a way that answers to the most pressing challenges. A fragmented ecosystem, on the other hand, is a system in which the actors do not communicate; where knowledge is siloed; where evidence is uncoordinated; and where multiple bodies, organisations and agents are overlapping or competing for visibility. From the perspective of a healthy ecosystem, an evaluation framework optimally should be designed to foster integration of the individual components as well as the overall collaborative and deliberative performance.

It is broadly acknowledged that science-for-policy ecosystems consist of several dynamic components, which are essential for evaluation. These components are placed along a continuum of different institutions and mechanisms, as outlined in the previous section, with some institutions responsible for producing evidence, others for synthesising and communicating evidence, and again others for adopting evidence in policy. In practice, these institutions are entangled and have overlapping roles and responsibilities. Opposite to a market, for example, with clear divisions between production and consumption, an ecosystem is fluid and dynamic with some institutions playing different roles at different times and with different intensities. An ecosystem consists of **closely interlinked, non-linear processes** of co-production and translation. Ultimately, knowledge that is perceived as valid and relevant to policymakers is the result of interlinked processes within the system (see also Oliver 2022).

In this interplay of components, it is possible to identify certain roles and mechanisms, for instance, **advisory institutions** whose main task it is to produce policy-relevant knowledge and translate evidence into advice by producing e.g., policy briefings, reports, statements, hearings, or informal input. Besides, advisory institutions, a well-functioning ecosystem consists of **policy institutions**, e.g., government agencies such as ministries, planning units, and other executive and parliamentarian support units who are seeking advice on technical, economic, and cultural matters.

Advisory units can be placed within or beyond academic institutions: they can be intermediary institutions, self-governing institutions, or in some cases independent units within government. Internal science services, such as the European Commission's Joint Research Centre (JRC), works at the boundary between policy and science with some divisions closer to traditional academic research and others closer to policymaking. Government institutions, on the other hand, are an essential part of the ecosystem in that they seek and apply inputs to decision-making by consulting scientific advisory bodies.

What happens at the interface is often described in terms of informing and shaping policies by providing and taking advice on complex issues, sketching possible solutions, or by evaluating and assessing the impact of different decisions and scenarios. Rather than a classical transmission model of knowledge (where evidence is transferred from one part to another), the intersection between science and policy is characterised by translation and integration of evidence through multi-layered processes. Yet, different institutions have different responsibilities. Policy cannot be determined by science. It may be shaped by scientific evidence, but in the end, the mandate to make decisions is placed with policymakers. Likewise, policymakers cannot themselves produce evidence but have to consult with scientists and science advisors for input. There is a fine line between evidence-informed policy and policy-biased evidence.

When evidence is reflected in new policies, it may be a good indicator of its relevance and impact. Advisory organisations who provide evidence in a timely and collaborative manner may have a higher likelihood to see their work adapted across the different stages of policymaking. However, the complexity of democratic decision-making makes it difficult – and methodologically unsound – **to attribute specific policy outcomes to particular advisory activities** (Pedersen & Hvidtfeldt 2023). The success of the advisory system should be measured by its preparedness to interact, its ability to coordinate, and its competence to synthesize and present evidence effectively: not by the final uptake or impact of scientific advice on policymaking (which could lead to adverse effects, such as lobbying and customising evidence to particular agendas).

For these reasons, indicators of evidence uptake and implementation is not the subject of this guidebook. Other recent initiatives have described the processes and structures that need to be in place to improve integration of evidence in policy. Such frameworks have been developed in the parallel project "**Evidence-informed policy making (EIPM): Framing, assessing and strengthening EIPM ecosystems**" prepared for DG REFORM's Competence Centre on Public Administration and Governance within the framework of the European Union Public Administration Country Knowledge (EUPACK) project (European Commission, Directorate-General for Structural Reform Support, Mackie et al. 2022). In contrast, this guidebook is focused on providing government evaluators with a set of instruments to assess the national advisory ecosystem and its performance. As such, the report presents a systemic approach to evaluating the maturity of national ecosystems of science for policy, their interactive capacity, and performance.

1.3 Diversity, fragmentation, and integration

For evaluators, an assessment of the national ecosystem should be possible to carry out within a limited timeframe and with limited administrative resources. The next sections will specify the dimensions and research questions the evaluator needs to pose to assess the main parameters describing ecosystem integration and health.

The suggested framework is intended to identify signals of integration as well as fragmentation. Concerns have been raised that a major challenge to science-for-policy ecosystems is indeed uncoordinated fragmentation. Sometimes, too many advisory bodies crowd the discussion and compete for attention and influence. At other times, government institutions are fragmented and organised in silos and therefore unable to deal with interdisciplinary advice. Across EU, the response to COVID-19 made it visible that evidence ecosystems do not integrate or coordinate themselves. When pressure is placed on governments to act fast and respond to an emerging crisis, they will mobilize the knowledge that is readily available and well-known whereas other parts of the ecosystem may not be consulted (European Commission 2021).

Convincing arguments have been made that most policy challenges today indeed are multi-dimensional and multidisciplinary and require interlinkages between evidence-suppliers and -users (European Parliament 2022). Take as an example climate change. To understand the social and technical drivers of climate change and climate action it is not enough to rely on evidence about the biophysical sphere, the decline of icecaps, or raising temperatures. No matter how important such physical and biological models are, they cannot stand alone. For science to inform policy, biophysical models need to be integrated with behavioural insights, social sciences, economics, and evidence about cultural values, communication, cognition, law, ethics, etc.

Examples like climate change make it clear that real-world policy problems do not respect disciplinary boundaries and cannot be addressed by individual scientific bodies. Rather, complex and interlinked problems call for **integration, coordination and learning** across disciplines and institutions. And for governments to draw on the full spectrum of advisory mechanisms it is important to understand and sustain a healthy ecosystem of science for policy.

A promising approach to evaluating the capacity of science for policy, therefore, is to focus on the **interlinkages** between the advisory institutions – rather than focusing on their individual performance described by traditional metrics, such as publications, citations, or influence. The next sections provide a conceptual and methodological framework for analysing and evaluating various forms of **advisory institutions and structures** that account for the intensity and quality of productive interactions.

2 Foundational principles of science-for-policy ecosystems

Before proceeding, it is useful to reflect on the foundational values underlying a healthy evidence ecosystem. The aim of the proposed evaluation framework is to ensure the continuing high quality, relevance, and availability to meet the needs of policymakers However, to maintain a healthy ecosystem, evaluators need to keep in mind a list of simple principles with which they can assess – and improve – the institutional, interpersonal, and financial interactions of the ecosystem. The basis for any evaluation is to make clear what the evaluation should improve and strengthen the ecosystem. The following foundational principles provide this benchmark. They identify key building blocks for a sound ecosystem and offer normative guidance for implementation.

The principles presented in this section should be used to embrace a **shared understanding** that a high level of independence, transparency, responsibility, accountability, and respect for diversity is part of the foundation of a well-functioning ecosystem. To be relevant, it is essential that Member States translate and adapt the principles to the national context in which they are implemented. The principles have been developed by consulting key international policy documents, guidelines, and code of conducts for the provision and implementation of scientific evidence in policymaking. They may serve as a normative basis that evaluators can use to address challenges, barriers, strengths, and potentials for improvements (European Commission 2022, UK 2021, OECD 2015, SAPEA 2019).

2.1 Independence

The principle of independent evidence is expressed in several high-level policy documents and is perhaps the single most important principle to observe. Evidence providers and advisers should be granted space to provide a balanced account without sanctions or ideological pressures. Evidence should be free from political interference, and advisers should be expected to act in an independent manner. Evidence providers should declare any direct or indirect conflicts of interest. And they should make clear in what capacity they are communicating. Independence is not about presenting objective or definitive advice to policymakers but about securing the procedures and autonomy under which evidence is produced and communicated. This is particularly acute in situations where the evidence is preliminary, the facts are uncertain, and contrasting conclusions may be reached. When stakes are high and decisions are urgent, it is necessary for governments to have robust mechanisms in place for integrating independent scientific inputs and assuring the public about the integrity of the advisory process.

2.2 Transparency

Closely related to independence is the principle of transparency. It is only by presenting evidence in a transparent, open, and accountable manner that independence and integrity is secured. Unless there are over-riding reasons, such as national security or the facilitation of a crime, evidence to governments should be made publicly available. The OECD takes a step further by not only demanding transparency about the process of science advice (appointments, conflict of interest, funding, etc.) but “as far as possible” requiring that “scientific advice and associated evidence should be made publicly available” (OECD 2015).

By establishing and promoting transparency, two conditions for good governance are satisfied: on the one hand, transparency should make it apparent to the public how evidence providers have reached their conclusions, thus allowing for scrutiny and openness, and on the other hand, transparency should make it clear that scientists are *advising* while policymakers are *deciding*. SAPEA adds that transparency improves the “robustness of the resulting decisions" by making the “evidence base and processes of reasoning behind any given area of policymaking open to public validation” (SAPEA 2019). Transparency and openness are key components of democratic governance, which serve to inform the public about the motivations and arguments behind public policies.

2.3 Responsibility

Responsibility is referenced by several code-of-conducts as a foundational principle for providing evidence to policymaking. To begin with, responsibility is a meta-principle. Responsibility is the principle that all foundational principles need to be respected. On a closer account, the principle of responsibility can be used to assess and guide how evidence providers are advising policymakers. According to the European Commission, “the EC is politically responsible for its initiatives; it must not appear to hide behind expert advice” (European Commission 2002).

It is the policy institution who is in charge of organizing and maintaining the commissioning of evidence that should take responsibility for the proper use of expert advice. The policy institution needs to have a clear remit with defined roles and responsibilities for its various advisers. Furthermore, evidence providers should be aware of their responsibility to society: When scientists accept the role as scientific advisers to the government, they shall be aware of the large influence scientific advice has on the process of public policy formulation, and act in awareness of their responsibility. In this sense, the principle of responsibility is part of a larger web of considerations about the democratic accountability of scientific advisory bodies.

2.4 Accountability

Over the past decade, the notion of accountability in public policy has gained significant influence. Accountability means that policymakers take responsibility for actions and decisions made on behalf of citizens. It also means that citizens, media, and other stakeholders uphold a capacity to keep officials accountable. The principle of accountability also has an ethical meaning. The European Commission defines the principle as the ability to "justify and explain" the way evidence has been involved in policymaking and declare what policy choices have been made based on advice (European Commission 2002).

Accountability implies a principle of fairness regarding the use of scientific knowledge by governments. Input and advice from scientists should be treated fair and without preconception or attempts to distort scientific knowledge or intentionally add wrong interpretations. Governments should be able to explain how scientific evidence is considered when drafting policies and legislation. Accountability also extends to the individual experts involved in producing and transforming evidence. In the words of the European Commission, individual advisers should be prepared to "justify their advice by explaining the evidence and reasoning upon which it is based" (European Commission 2002). Holding the evidence providers accountable implies that the bodies, mechanisms, and people involved should be able to explain how the research is produced; if there are competing hypothesizes; how the evidence is weighted; and if there are critical uncertainties in the knowledge base etc.

2.5 Diversity

Diversity in research and scientific evidence is a critical issue as society is moving forward and correcting the narrow-mindedness and dogmatism of the past. Diversity may include several dimensions e.g., diversity of stakeholders, disciplines, perspectives, beliefs. Governments need to encourage balanced advice based on broad perspectives and with sufficient time and space to discuss different policy options and solutions. The quality of evidence is inherently related to the diversity of perspectives. Wherever possible, a diversity of viewpoints should be encouraged, and advisory institutions should be allowed to formulate and communicate various possible outcomes considering uncertainties and scientific disagreements.

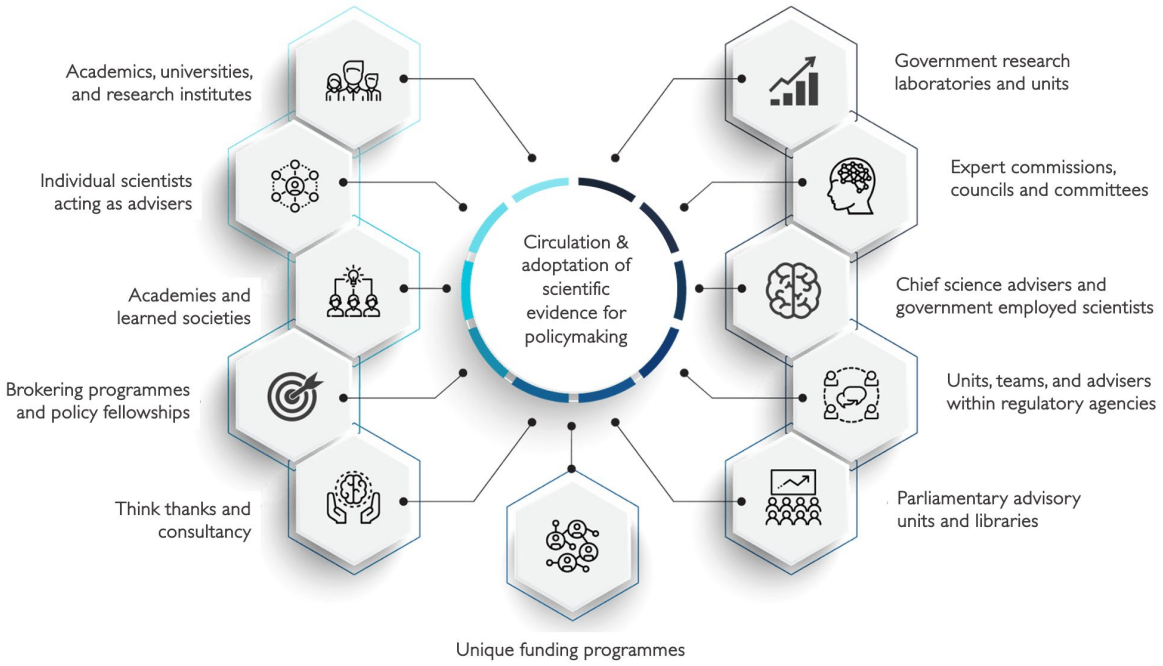
Diversity may ensue from differences in scientific approaches, different types of expertise, different institutional affiliations, or contrasting opinions. OECD (2015) adds more detail to the principle of **interdisciplinary diversity**, stating that governments should engage "all necessary scientific expertise across disciplines to address the issue at hand" and not restrict advice to e.g., technical, or regulatory evidence but include all parameters relevant to the policy issue (e.g., social, ethical, demographic, etc.). Plausibly, the principle of diversity could be expanded to include not only the perspectives of different disciplines but the inclusion of different actors. OECD emphasizes the inclusion of diverse actors by "giving explicit consideration to whether and how to engage non-scientific experts and/or civil society stakeholders in framing or generating the advice" (OECD 2015). For these reasons, signals of a healthy advisory ecosystem include the diversity and variety, multiple interlinkages and translational mechanisms, and polycentric learning.

Together, these principles form an attempt to create a values framework, which may be helpful to assess best practices and formulate recommendations relevant to the national ecosystem of science for policy. Situating the evaluation within a set of foundational principles is a good starting point for further discussions about drivers and barriers to the use of scientific evidence in policy and the governance mechanisms underlying it. Reflecting on the foundational values of the use of evidence in policy should encourage reflexivity and improve learning across the relevant advisory units and policy institutions. A healthy ecosystem needs mechanisms of self-observation and self-evaluation to be able to learn and experiment.

3 Methodology

The proposed assessment framework primarily takes the perspective of the Evaluator (governmental staff, consultant, evaluation unit), who are tasked with the assignment to evaluate a national or sub-national ecosystem of science for policy, including the formal and informal mechanisms to connect scientific evidence with policy and the processes to make these formal and informal mechanisms effective.

Figure 1. Science-for-policy ecosystem



Source: Own elaboration.

The suggested assessment framework looks to unpack evidence-informed policymaking starting from the perspective of the research and evidence ecosystem and the interactive mechanisms to promote translation and implementation of evidence in policy. In the depicted diagram, the left side primarily describes institutions and mechanisms that are **external to government** whereas the right side represents instruments that are **internal to government** agencies or initiated at their request.

Both sides of the ecosystem work to enhance circulation and adoption of evidence in policy but from two different starting points: whereas external instruments and structures work from "the outside" by providing evidence and expertise either unsolicited or at the request of policymakers, internal mechanisms are part of the political apparatus and work under the jurisdiction of government agencies. Universities, academies, councils, individuals, and think thanks etc. are independent from government and may communicate evidence with or without prior request. They may be tasked with specific assignments (collecting, synthesising, and presenting evidence, convening key stakeholders, delivering data or recommendations etc.) or work to raise awareness and build capacity in areas where policymakers have not yet unpicked or understood the underlying scientific and technological issues (such as climate studies, energy transition, economic modelling, security, foreign policy, culture etc.).

On the other hand, internal mechanisms work as an integral part of the administration with daily interactions and routines connected to the policy arena in which they are located. At times, internal science services may be granted different degrees of autonomy: they may work independently of political leaders with the mandate to raise new issues and flag emerging problems (chief science advisers, expert committees, government labs etc.) or they may work at the request of governments (commissions, units, and teams within regulatory agencies etc.).

Finally, the lower part of the diagram represents unique science-for-policy funding programmes. Funding may be allocated to external or internal evidence brokering activities, projects, or events. It may be allocated as part of larger investment programmes, as specific targeted funding, framework programmes or public

procurements, or arise from the interest of research councils and foundations to promote better use of evidence in policy.

What is absent in the diagram are policy institutions themselves. They also belong to the ecosystem in the sense that they are responsible for commissioning, co-creating, and translating evidence into legislation and policy (see Section 1.2.). Besides the units listed at the right side of the diagram, examples of such translational processes include **policy units, policy analysis, expert hearings, preparation of government meetings, parliamentary committee meetings, council meetings etc**. which are located within government, e.g., the prime minister's office, ministries, regulatory agencies, or parliament. In these settings, policymakers and support units regularly interact with internal and external scientists and other evidence providers to explore scenarios and implications of political action.

With regard to the **capacity to act on evidence** among policy institutions, their internal workings and structures, these questions are outside the scope of the present evaluation framework. In a parallel project overseen by the EU Directorate-General for Structural Reform Support, the EUPACK 2021 and 2022 case studies have piloted a set of indicators for measuring the institutional capacity for evidence uptake. The EUPACK case studies show how policymaking is an iterative process of policy formulation and implementation (assessing situations, weighing options, making choices, instigating change). In this perspective, the capacity to act upon evidence should be studied as part of a broader field of government assessment. Policies are formulated and adopted in a complex interplay between values, beliefs, public deliberation, electoral contracts, fiscal objectives, and scientific evidence and advice.

Ultimately, the central part of the diagram is the arena in which evidence is circulated and adopted. It is a fluid and non-linear space of interactions: **the circulation and flow of knowledge across the ecosystem** describes the links and interactions that enables connectivity between evidence and policy, and the structures, instruments, and mechanisms needed to facilitate it. In this dynamic space between internal and external knowledge providers, the crucial metrics of success are **connectivity, coordination and learning.** The capacity to connect evidence with policy as well as the capacity to make research and evidence accessible to policymakers are key benchmarks of a healthy ecosystem. ([3])

3.1 Productive interactions

Over the past decades, governments and research institutions have encouraged active collaboration between science, society, and policy. The overarching goal of most efforts has been to build stronger links between the research sector and societal fields such as industry, civil society, and the public sector. In particular, universities and funding bodies have focused on initiatives, such as partnerships, missions, and transdisciplinary projects that increase knowledge exchange and co-creation between researchers and practitioners. As a result, traditional forms of research evaluation are no longer sufficient. Commonly used indicators that relate to academic aspects only, such as publications, citations, funding, etc. are not adequate to assess research in the context of policymaking. Instead, methods and indicators are needed that describe the **productive interactions** within a broader and more fluid field of knowledge exchange. These can be quantitative as well as qualitative.

Assessment in this context therefore needs to include organizational aspects, such as resources, structures, and expectations of stakeholders, their knowledge needs and requirements. Developing frameworks and indicators to assess the flow and exchange between evidence and policy requires a dynamic and multifaceted set of methods, which highlight different **contributions** to the policymaking process (rather than merely assessing causal influence). An evaluation framework for science-for-policy ecosystems therefore needs to focus both on the processes and outcomes of advisory organisations. This is generally known as **contribution analysis** (van Drooge & Spaapen 2022).

Before elaborating on the evaluation methods suitable to science-for-policy ecosystems, it is important to highlight a conceptual distinction between two main types of evaluation (Scriven 1996):

1. evaluations which are conducted to *account for* or *rank* performance (summative evaluations), and
2. evaluations that aim at *mutual learning* and *improvement* (formative evaluations).

[3] Dimensions such as the **openness** of policymakers to evidence-informed policy making, the ability of policymakers to **access sources of evidence**, or the willingness of policymakers to actively **procure evidence** are not covered in this evaluation framework. It is the subject of assessment in the EU Directorate-General for Structural Reform Support (2022) report "Evidence-Informed Policy Making: Building a conceptual model and developing indicators". The focus of this guidebook is on the **availability of structures and processes** with which policymakers can identify, access, and request evidence as well as the ability of scientific advisory bodies to make their advice available and accessible.

For the first function, accountability and efficiency are the primary motives. In this context, evaluations are usually focused on a **unidirectional relationship** between a principal (a government, research council, university) and a performing agent (research entity, provider, contractor). In contrast, the second function focuses on **shared learning** as the primary goal of evaluation. The goal is to analyse and optimize the different contexts in which evidence and research are produced, circulated and implemented.

> *[F]ormative evaluation regards networks of multiple partners who, in more or less stable structures, work together aiming to solve a joint problem or question. Evaluation in such networks is a joint responsibility and will benefit from procedures in which different stakeholders play a role (van Drooge & Spaapen 2022).*

One particularly interesting approach comes from the field of research impact assessment. The SIAMPI framework (abbreviated from Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions between science and society) provides a set of actionable evaluation tools based on the central notion of **productive interactions** (de Jong et al. 2011).

The model is built around a non-linear understanding of social impact as a result of dynamic interactions and joint efforts between several actors inside and outside the academic community. The SIAMPI model is particularly well-suited for studying science-for-policy interactions, where evidence is typically only one component of a complex social and political processes. The theory of productive interactions highlights how informal and decentralized interactions between actors can lead to dynamic exchanges and effects. The framework states that "it is only by analysing the processes that induce social impact that we have a chance of recognizing potential research impacts" and the contributions made by research that might otherwise not be evident (Spappen & van Drooge 2011). Or in another version of the argument:

> *In open, non-linear and networked systems, academic knowledge should be seen as a dynamic part of a wider process of knowledge production in which stakeholders bring in their own expertise, knowledge and insight. Societal impact is thus the outcome of the creative encounter of stakeholders and their contributions to a common goal (Akker & Spaapen 2017).*

These methodological observations can be adopted to the evaluation of science-for-policy ecosystems. Instead of focusing on linear models of knowledge dissemination and translation, measured by quantifiable outputs (such as reports, citations, or other proxies), an assessment framework based on productive interactions focuses on the dynamic processes of scientific advisory bodies and their links to other institutions in the ecosystem (such as structures, mechanisms, and capacities). The productive interactions framework captures the flow of knowledge between sectors and the capacities that create a viable and interconnected ecosystem.

The consequences of this approach may seem complex at first sight:

1. The unit of analysis shifts from individual advisory bodies towards the quality and volume of productive interactions.
2. The number of stakeholders involved in delivering outputs and outcomes expands.
3. Evaluators should assess not only individual institutional performance but networks of interacting stakeholders: they cannot simply rely on quantitative measures since these are not adequately capturing the relevant performance.

However, there are solutions for most of these issues: for example, surveys and interviews focusing on the **coordination, integration, and learning** among the involved institutions can be constructed. Evaluators can develop quantitative measures to track and assess formal interactions (such as funding, contracts, briefings, meetings, policy labs, consultations etc.) and build convincing case studies that contextualise the available data. Case studies can highlight how scientific advisory bodies play a catalytic role as brokers or mediators between different stakeholders, policymakers, and effected publics (Renn 2021). Focusing on the

interactive processes of the ecosystem enables a more nuanced assessment and raises awareness by all stakeholders about how desirable outcomes are achieved.

The SIAMPI framework distinguishes three kinds of productive interactions that reveals how knowledge is produced and circulated between stakeholders. These three types of interactions show how evidence providers interact with each other and how they communicate and interact with the policy community that they advise and support:

Table 1. Indicators of productive interactions.

Direct interactions	Face-to-face interactions with user communities, clinical and charity professionals, peer groups, administrators or commercial companies Number of researchers holding dual posts Number of memberships of advisory committees Number of presentations for lay audiences
Indirect interactions	Contextual Response Analysis (CRA): analysis of uptake of electronic outputs (e.g. reports, papers etc)
Financial interactions	Contracts, licences, project grants, sharing of facilities, personal sponsorships, travel vouchers.

Source: Adapted from: Spaapen, J., & Van Drooge, L. (2011). Introducing 'productive interactions' in social impact assessment. Research Evaluation, 20(3), 211-218.

In principle this typology of interactions can be adopted and expanded in correspondence with the interactions at the science-for-policy interface. Drawing on the taxonomy of advisory mechanisms presented in Gluckman (2017) and expanded further by Pedersen & Hvidtfeldt (2021), relevant interactions include:

Table 2. Indicators of science-for-policy interactions

Direct interactions	Face-to-face interactions with policymakers Number of researchers participating in expert advisory panels Number of researchers serving on government commissions Number of presentations for policy audiences Number of co-creation events and meetings organised
Indirect interactions	Digital and material interactions with policymakers Number of policy advisory reports and statements Number of policy papers authored and co-authored Number of policy briefings produced and published Number of datasets accessed by policymakers etc.
Financial interactions	Funding and grants available for science to policy initiatives Support for policy fellowships Support for jointly organised events and projects Special calls for projects and programmes to support policy

Source: Own elaboration.

Importantly, quantitative data about the volume and intensity of interactions needs to be integrated in qualitative case studies through which the evidence of contributions is further described and substantiated. In this "narratives by numbers" approach, the individual advisory bodies can both explain how they reach impact and contextualise their performance with reference to the development level of the local ecosystem (Jonkers et al. 2018). For instance, a relatively low number of interactions can lead to a relatively high impact. A few

workshops with the right stakeholders can scale into policies or new advisory processes that attract political endorsement.

Effectively, the productive interactions model suggests that science-for-policy interactions are understood as part of a larger web of knowledge production, transformation, and exchange over various steps in the policy process. As an evaluative tool, the objective is to locate and describe these interactions more precisely. The assessment of productive interactions reflects how knowledge flows in multiple ways, e.g., into policy guidelines, white papers, websites, emergency response, and how evidence is made accessible through e.g., memberships of committees, working groups or through meetings or projects that attract financial support.

The distinction between direct interactions, indirect interactions and financial interactions is useful as a heuristic for the assessment of different types of outputs and outcomes. However, in practice most successful advisory processes consist of a combination of productive interactions and form a larger network of fluid interactions. In some cases, initial interactions may lead to cascades of larger series of interactions which scale as they reach higher levels of impact.

For example, a written contribution to a policy report (indirect interaction) may lead to the appointment of the author to become a member of a working group (direct interaction) with face-to-face meetings with policymakers. The written statement may also lead to collaborations with other partners in the ecosystem, which in turn leads to the formation of new projects and initiatives that receive funding (financial interactions). Likewise, a project that receives funding as part of an initiative to promote science for policy may lead to face-to-face interactions and written inputs etc. In this situation, it is the strength of the network and the quality of interactions that are essential to assess.

Per se interactions do not tell the full story about implementation or impact. They tell a *partial* story about the intensity of knowledge exchange within a network of stakeholders. In this capacity, they tell evaluators something about **the conditions for implementation and impact**. Recurrent interactions are more likely to lead to implementation and impact. On this account, productive interactions account for **pathways to implementation and impact** rather than final effects or changes. This is an important methodological distinction that should make evaluators cautious to use the assessment model for e.g., funding allocations or rankings. It is a learning model that will help governments to assess the volume and quality of interactions and facilitate better communication and connectivity across the ecosystem.

The result of this approach is that the assessment of the ecosystem necessarily should not focus on individual performance (i.e., the performance of the individual advisory bodies measured in simply output metrics) but on collaboration and integration across various relevant stakeholders who are working together, combining different kinds of knowledge and expertise, and designing joint solutions to policy agendas or problems.

3.2 Qualitative and quantitative assessments

Before proceeding to the design of the guiding principles for the assessment protocol, it is worth contemplating the availability and appropriateness of different data sources. A self-assessment of the national ecosystem of science for policy will have to combine different sources of data, some of which can be harvested from independent sources and others from locally constructed sources. A sound approach to evaluation is to use a mix of quantitative data and qualitative methods.

In peer learning and peer review qualitative assessments play a significant role. Assessing the quality and relevance of providing research evidence to policymakers includes reading self-assessment reports, interviewing research leaders and advisers, conducting site visits, and organising consultations. For this purpose, an expert panel needs to be appointed who will carry out the assessment. The expert panel (hereafter named Review Panel) should have a clear mandate to access the relevant documents, stakeholders, and data sources (see Section 3 and 4).

Optimally, the Review Panel should be composed of former and current experts in science for policy. The secretariat aid of the self-assessment exercise can be placed within the centre of government or within a sector ministry e.g., national ministry of science, or it can be placed with an independent consultant. Transparency about appointment criteria and declaration of potential conflicts of interests are essential prerequisites for a credible and efficient evaluation process.

Occasionally, Review Panel members will read and review the scientific content of individual policy papers and contributions (Section 3.4). However, focusing on the productive interactions across the ecosystem should be less occupied with individual products or outputs and more with the communication and connectivity across

institutions. For that reason, the Review Panel should seek as much knowledge as possible to form an opinion about the **interchanges and quality of interactions** within the ecosystem.

For example, evaluators need to assess the volume and quality of communication across different advisory institutions, the diversity of actors consulted, and the multi-disciplinarity of advice and evidence prepared for government. Such parameters will need input from respondents across the ecosystem, e.g., submitted as part of the self-assessment reports or provided from in-person interviews. Panel evaluations may also include assessment of leadership skills, governance structure, team composition, and knowledge exchange competences etc. (see Section 3.2).

The evaluation is designed to assess the quality and relevance of interlinked advisory mechanisms based on the understanding that most science-for-policy processes are non-linear and serendipitous. Evaluation procedures need to be flexible, process-oriented, and able to review the different contributions of partners and the productive interactions between them.

Furthermore, the Review Panel will need access to **quantitative data** about productive interactions. In the prior section, several examples of such indicators were presented, e.g., the number of meetings, presentations, briefings, testimonials (direct interactions); the number of reports, statements, position papers, evidence syntheses (indirect interactions); and the amount of project funding or other financial support mechanisms for science-for-policy activities (financial interactions). In an ecosystem perspective, these data describe the links between multiple institutions and organizations. The resulting picture should give the Evaluator information on centre/periphery relations, cliques, niches, and bridging actors – for example by using quantitative network analysis.

When provided with these quantitative data, evaluators can conduct a comprehensive assessment based on the inputs from stakeholders (interviews, site visits, consultations, surveys) and objective numbers of interactions. In several cases, there is no pre-existing database for such interactions. In some countries, there may be data available about financial transactions and some advisory institutions will keep track of their publications, meetings, appointments, and assignments. But the assessment process should allow each of the relevant advisory bodies within the ecosystem time to collect such data, for example, during a window of 6-12 months.

By collecting data from the individual institutions (e.g., in the form of self-assessment report containing descriptions of productive interactions) the Review Panel will be able to form a coherent, cross-institutional evaluation of the **interactivity, diversity, and integration** of the ecosystem.

Any evaluation design is challenged by the fact that the functionality and performance of diversified networks or ecosystems are distributed across a variety of stakeholders each with their responsibilities and accountability. This aspect has consequences for the ways in which evaluations can be designed and deployed. Central data collection could be organised from the principle of 'low hanging fruit' as it should be based on readily accessible data through e.g., official sources and interviews. Other indicators that might be more difficult to measure, or which comprise multiple variables and/or involve multiple explanatory factors, could also be proposed for further research, characterised as 'high hanging fruits' (European Commission, Directorate-General for Structural Reform Support, Mackie et al. 2022.

3.3 Panel review and assessment plan

Five-step guide to set up panel review at national level:

1. **Identifying panel experts**: Identify five-seven experts representing the different stakeholder communities in evidence-informed policymaking, preferably with no official leadership roles in the current ecosystem. Experts should represent knowledgeable actors across different domains, they should be familiar with scientific methods and practices, include critical outstanders (such as media or NGOs with scientific backgrounds), and have experiences with institutional reviews and evaluations, at the local, national or international level.

2. **Securing diversity**: Make sure that the panel members display sufficient diversity across policy domains and disciplinary fields. Avoid "purism" in approaching possible experts. They should not be restricted to e.g., health sciences or engineering, as evidence needs among governments involve all fields of policy including advice from the social sciences and humanities. Do not limit experts to

researchers from academia but acknowledge that science for policy draws on several sources of knowledge, including practical knowledge, professional knowledge, etc.

3. **Managing expectations**: Create a meeting schedule for the Review Panel to meet over five meetings: First meeting is a scoping meeting, where the Evaluator presents the panel members with the design and layout of the assessment, its different steps, desirable outcomes, methods, and resources, including availability and collection of quantitative and qualitative data. Manage expectations in terms of how panel members should be involved in preparation of meetings, site visits, and how members should take active roles in interviews with stakeholders. Second, third and fourth meetings are organised as interview sessions and/or site-visits to organisations or **practitioners with central responsibilities** in the ecosystem. Fourth meeting is a closed work meeting for the panel to review interviews and qualitative data and integrating quantitative insights about productive interactions to meet the requirements of the evaluation. Fifth meeting is drafting and concluding on recommendations and main findings and observations based on the qualitative and quantitative materials developed in prior meetings.

4. **Collecting and analysing data**: The Evaluator should collect and present data to the Review Panel to support the assessment. This data should be organised roughly in two separate files: one stream of data is centred around **qualitative interviews, site-visits, and reading material** (e.g., examples of reports, briefings, outputs, statements), while another stream of data is presented by **quantitative sheets and records of productive interactions** by the individual organisations of the ecosystem. The number of involved institutions, structures, or mechanisms involved will vary across countries, with some countries having fewer institutions and other countries a larger multiplicity of bodies. All involved institutions are asked to submit a self-assessment report based on productive interactions defined in the next section as well as participate in interviews. Assessment reports, interviews, and fact sheets form the core material that the evaluation panel will use to assess the ecosystem performance.

5. **Formulating recommendations**: The assessment of the ecosystem should follow the norms presented in the prior sections: it should focus on the overall trans-institutional health of the ecosystem, its internal communication and integration, and the quality and volume of productive interactions with the ecosystem. Where relevant, the evaluation panel should make clear statements about (a) the diversity of the ecosystem (e.g., diversity of interactions, diversity of structures, diversity of disciplines involved), (b) the coherence and strength of coordination across institutions, (c) the competences and skills held by the relevant institutions and their staff, and (d) the transparency and autonomy of the ecosystem, e.g., the findability and accessibility of evidence and the readiness of institutions to act upon request, e.g., seen from the perspective of policymakers and government.

Finally, to emphasise learning outcomes, recommendations should be presented by the Review Panel at different public events or seminars where central actors of the ecosystem will have the opportunity to respond to the report and contextualize its findings. In its final conclusions, the Review Panel should recognize e.g., gaps in the data, ambiguity, and related uncertainties regarding the evaluation. Again, the assessment is not designed as a "ranking" or traditional performance review. Due to the fluidity and interconnectedness of the ecosystem, it is **the capacity to interact, collaborate, and respond** to emerging policy problems that is essential to evaluate.

This five-step plan for assessment of science-for-policy ecosystems in a schematic way can be seen in Figure 2.

Figure 2. Five-step plan for assessment

Source: Own elaboration.

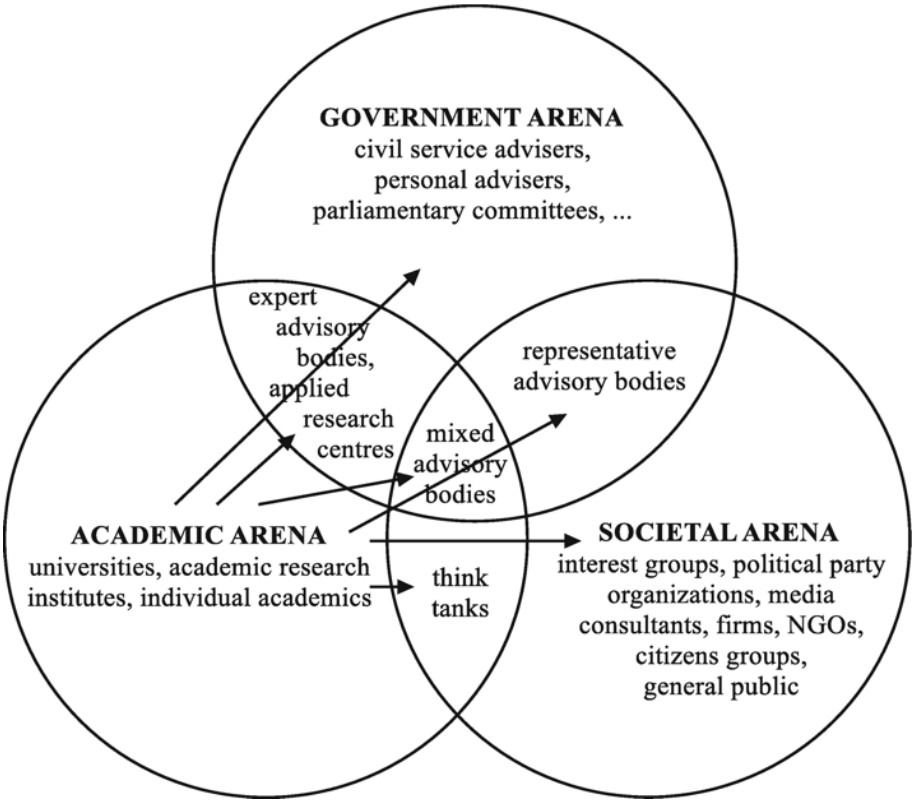
4 Assessment guidelines and design principles

As outlined in the 5-step plan for organising the system assessment, the evaluation framework consists of a combination of qualitative and quantitative information, which form the basis for the observations and recommendations presented in the final assessment report. This section presents guidelines for collecting data corresponding to the two overall data sources adopted for the review. First, the qualitative questions are presented, which should inform interviews and self-assessment reports submitted by the involved institutions under review. Next, a list of tentative indicators is presented in Section 4.

4.1 Review of institutional capabilities

The first batch of questions regards the capabilities and roles of the different mechanisms across the ecosystem. A first sketch of the ecosystem should be constructed by (1) identifying the relevant institutions, structures, and instruments relevant for the assessment, and (2) identifying their roles and mandates by reviewing legislation, instructions, and missions. This review includes but are not restricted to advisory units across the following institutional arenas:

Figure 3. Model of the policy advisory system



Source: Adapted from Blum and Brans (2017).
Note: In its original conception the arenas were termed 'internal government arena', 'external academic arena', and 'external lay arena'.

Second, the Evaluator together with the Review Panel should identify roles and mandates. For example, it is relevant to examine the availability of (a) technical, (b) behavioural, (c) legislative, (d) emergency, and (e) multidisciplinary science-for-policy instruments. These structures may overlap but are important to map to get an initial understanding of the ecosystem. A multidisciplinary advisory unit may or may not include behavioural science advice. Emergency science advice may or may not be multidisciplinary etc. Despite this categorical overlap, each of the institutions under review should submit a self-assessment report with a multiple-choice option for identifying their "main area of competence". This should help reviewers identify possible competence gaps.

This exercise constitutes a first attempt to map the diversity of the ecosystem in terms of structures and mandates. During this part of the assessment process, it is important to keep an open mind regarding the different entities and bodies providing input and evidence to policymakers. Governmental agencies may

consult with a complex set of external institutions, some of which are typically long-established (universities, research institutes, national academies etc.) while others might be more fluid in coming into existence (committees, working group, commissions, non-governmental think tanks etc.).

While these bodies may rely to varying degrees on public funding, most operate **independently** (with exceptions, e.g., think tanks with party affiliations) and organise themselves either autonomously (e.g., academies) or as part of a government agency.

Hence, the Evaluator should be clear when mapping their missions and mandates: to assess the diversity and overall health of the ecosystem it is important not to restrict the assessment to only 'in-house' science services, including research units, public institutes, and agencies under ministerial authority. To broaden the assessment to include wider ecosystem actors it is recommended to involve public and non-public bodies in the research community, including experts and science-for-policy forums of different kinds (to the extent they are responsible for providing evidence to policymakers). ([4])

Initially, this mapping should provide the Evaluator with a first understanding of **institutional diversity** within the ecosystem (mandates, legislation, level of government). As stated in the foundational principles in Section 2, diversity of advisory units is a defining feature of a healthy ecosystem. However, the degree to which diversity across institutions is desirable, depends on a number of variables. Foremost, the Evaluator should assess if diversity leads to fragmentation or unhealthy competition among advisory units. When several advisory bodies are asked to provide input on the same issue, policymakers may have a hard time to discern who to listen to and assess the robustness of advice. In this case, diversity leads to fragmentation and ambivalence rather than integration and coordination.

4.2 Review of competences and skills

Equally important is a review of the key **competences and skills** within the ecosystem. This is not a trivial task since most competences are not visible from official mandates or public websites. Hence, mapping science-for-policy competences needs to be an integrated part of the self-assessment report (submitted by the institutions under review) as well as the interviews with leading scientists and managers across the advisory ecosystem.

For the purpose of the self-assessment report and the interview guide, the Evaluator should ask the relevant institutions to map their mission and mandate onto the following examples of competences (Table 3).

Each category is compressed from a wide body of literature, which can be consulted for more input and inspiration (Topp et al. 2022). However, in its simplistic form, the list can help the Evaluator to understand the overall distribution of roles and competences within the ecosystem.

[4] As demonstrated by the different "arenas" represented in figure 2, the list of relevant advisory bodies depends on the local composition of the ecosystem. It might include entities such as government research institutions, government commissioned research, scientific councils, self-governing research institutions, official commissions, expert panels and committees, parliamentary advisory units, individual scientists acting as advisers, think tanks, national academies, Chief Science Advisers, What Works Units, foresight units, etc. For further examples, see the country studies published as part of the JRC S4P ecosystem workshop series organised between September 2020 and September 2022: https://europa.eu/!jW9NXq.

Table 3. List of roles, functions, or responsibilities

Knowledge Generators	Producing original specifically relevant scientific knowledge at the highest international level
Knowledge Synthesis	Producing overviews and integrated assessments of existing scientific knowledge and best practices
Knowledge Broker	Translating, adapting and communicating relevant scientific knowledge to policy and decision-makers
Unsolicited input	Providing advice to policy and decision-makers on own initiative if new important issues are identified
Requested input	Responding to specific questions from policy and decision-makers, e.g., risk-assessment
Rapid response	Acting immediately in emergency situations where consequences or effective responses are unknown
Identify options	Pointing out potential actions and their consequences regarding politically desired societal developments
Implementation and monitoring	Collecting data on effects of regulations and facilitating execution of decided actions
Evaluation	Retrospective analysis and appraisal including issues of issues of responsibility and liability
Open category	If the above are not applicable, list other functions

Source: Own elaboration based on a wide body of literature.

Another, more comprehensive source of inspiration when mapping and assessing the skills needed to provide evidence for policy is the *JRC Competence Framework for Policymakers and Researchers Working on Public Policy* (Schwendinger et al. 2022). The framework consists of 27 competences divided into five clusters:

1. Understanding Policy,
2. Participating in Policymaking,
3. Communication,
4. Engaging with Citizens and Stakeholders, and
5. Collaborate.

For instance, collaboration involves competences such as convening and facilitating policy meetings, system thinking, intercultural sensitivity, group dynamics and cultivating a collaborative mindset. Participating in policymaking includes competences such as knowledge brokering, drafting policy briefs, writing for policymakers, and establishing a community of practice.

Several of these competences have to do with the specific skills needed to provide science for policy, such as synthesising research (generating state-of-the-art knowledge on a policy problem) and understanding policymaking (knowing when and how to present evidence effectively). The JRC competence framework covers both practitioners in public administration and researchers who are active in the science advisory ecosystem.

Another example of mapping competences can be found in the country study *The Danish Eco-System of Science for Policy* (Pedersen and Hvidtfeldt 2021). This study presents the following dual structure, which combines the analysis of mechanisms and competences by attributing specific values (+/-) to the different science-to-policy competences distributed across different examples of mechanisms:

Table 4. List of mechanisms and competences

Competences / Mechanisms	Knowledge Generator	Knowledge synthesis	Knowledge broker	Unsolicited input	Requested input	Rapidness	Identify options	Monitoring	Evaluation
Government research institutions	+++	+++	++	+	++	++(+)	++	++	+
Government commissioned research	++	+++	++		+++	+/-	++	+++	
Scientific councils		++	++	++	+	+	+++	+	+/-
Self-governing research institutions	++	++	+(+)	++	+(+)	++	+/-	+++	
Government commissions	+	++	+	+/-	++				+++
Expert panels & committees		++	++	+/-	++		++		
Individual advisers	+(++)	+	+	++	++	+++	+/-	+/-	+/-
Think tanks		++	+	++	+		++	+/-	+
National academies	+	++(+)	+	+	++		+/-		
Chief Science Adviser		+	+++	++	+++	+++	+		
What Works Units		+++	+	++	+	+/-			

Source: Adapted from Gluckman (2017) and adapted by Pedersen and Hvidtfeldt (2021).

For each of the mechanisms found in the national ecosystem, a description of the embedded competences is needed to substantiate the panel deliberations and conclusions. For this purpose, it is important to obtain a good understanding of the different competences and how they are applied in specific and general science-for-policy settings.

Information about the different competences should be obtained by instructing the institutions and mechanisms under review to submit supporting material in the self-assessment reports, which will provide the panel members with an overview of the competences at play. Furthermore, the Evaluator can ask respondents to substantiate the description of embedded competences in more detail during face-to-meetings and interviews. ([5])

4.3 Review of funding and support

The availability of funding for policy-oriented research and science-for-policy activities is an important indicator of ecosystem health, in particular, if funding is distributed across diverse sources and encourages different types of advice. For research institutions, funding is an important motivation to set up entities and encourage experts to work on science-for-policy related issues for longer or shorter periods. In contemporary research cultures, there is a strong focus on funding for fundamental research and teaching and less on funding so-called "third mission" activities, including knowledge brokering and knowledge exchange. In addition, most performance measures adopted by universities and other research institutes focuses on peer reviewed publications and less on incentivising knowledge transmission and exchange. ([6])

For these reasons, it is essential for the Evaluator and Review Panel to assess financial interactions within the ecosystem. Some entities are receiving block funding, whereas others have to compete for contracts through open calls. Creating an overview of the financial transactions within the ecosystem provides a framework for assessing the terms and conditions under which evidence-for-policy bodies enable researchers to work with governments and inform policymaking. Data about financial interactions may be collected through self-assessment reports (see Section 5.3). In addition, the Review Panel will need to assess if the different sources of funding is suitable to the ecosystem and encourages diversity and integration across e.g., funding instruments such as:

- Annual or multi-annual government funding from the Annual State Budget, or from the budget of individual ministries (or other central policymaking bodies).
- Performance contracts between ministries and public research institutes, including priorities for research topics and research needs.
- Open calls to the research community to apply for funding for strategic projects to provide knowledge based on scientific evidence for policymaking.
- Contracts announced to invited universities or other bodies to commission research that generates evidence for policymaking.
- Availability of government-funded research reports, meetings, policy labs, or platforms that are intended to inform policy making (e.g., digital research repositories, publication series, etc.).
- Small-scale grants for evaluating specific policy areas or delivering small-scale consultancy assignments for evidence-informed policymaking.

The Review Panel should take notice of the fact that funding can be allocated to a number of different institutions, for instance, government offices of science and technology, foresight units, networks of ministerial science advisers, behavioural insight units, scientific and regulatory agencies, the wider science system, academies, learned societies, knowledge exchange and policy engagement units; and a mix of bodies, such as independent advisory councils, ethical councils, and other entities.

[5] Besides the competences described in the JRC skills framework, there is a large body of literature describing different forms of knowledge brokering, knowledge translation, knowledge mobilisation, and other skills needed for effective knowledge exchange between researchers and policymakers, e.g., Spruijt et al. (2014), Oliver et al. (2014), Newman et al. (2020), Budtz Pedersen and Hvidtfeldt (2021).

[6] Despite the overwhelming focus on academic outputs, research performing organisations and research funders increasingly are taking steps to consider better channels for knowledge transfer, including mechanisms that promote science for policy. See for example: https://doi.org/10.5281/zenodo.7777542

4.4 Review of deliverables and outcomes

The Evaluator together with the review panel will need to inform themselves about significant outputs and deliverables from the advisory units under review. This does not need to include deep reading of technical reports, but the review should be based on an informed assessment of the quality, volume, and delivery of outputs. For the purpose of instructing the self-assessment, each of the institutions and mechanisms under review should be asked to submit a list of five deliverables from a reference period of two years. In the supporting material, each deliverable should be described briefly in terms of:

1. who commissioned or initiated the output,
2. who was the output intended to reach and impact,
3. how was the output delivered and received, and
4. to what extent did the output create observable changes of practice, policy, or behaviour.

The Review Panel will have to rely on input from self-assessment reports but can also invite representatives from the advisory system to submit their opinion about **availability of outputs** and the **reach and relevance** of evidence. As this guidebook is primarily concerned with assessing the accessibility and interlinkages of science-for-policy instruments, case studies may be used to create a better understanding of the flow and impact of evidence as it is produced, circulated, and absorbed in policymaking. However, as mentioned in prior sections, this exercise should not be used to rank or reward any individual institutions. Whether or not a particular piece of evidence is reflected in the policies adopted by government is not the responsibility of the advisory units but of a larger web of interacting factors, including the urgency and configuration of policy institutions. However, advisory mechanisms that display low availability of outputs and low readiness to respond to policy issues, should be assessed critically and with reference to suggested improvements.

Reading and assessing examples of deliverables, position papers, and other outputs will help the Evaluator and Review Panel to form conclusions about the timeliness, relevance, and reach of the bodies under review. Such information can also be used to inform interviews with stakeholders across the ecosystem. The Review Panel can ask interview respondents to substantiate their remarks on quality, relevance and impact, and explore potentials for improvements and quality control moving forward.

4.5 Review of system integration and learning outcomes

Finally, the Review Panel will need to form observations about the strengths and weaknesses of systemic links within the ecosystem. This should be presented as an overall synthesis of information collected through the prior steps of the review process (Section 4.1-4.4) as well as by consulting the quantitative data (supported by e.g., social network analysis) presented in Section 5.

For this purpose, the Review Panel cannot rely either on quantitative or qualitative data but needs to combine both sources of information **to assess the networks and variegated interactions, learning, and communication among the diverse stakeholders that are part of the ecosystem**. For the purpose of structuring the self-assessment reports (submitted by the advisory units included in the review) as well as for structuring the interviews with representatives of the national ecosystem, the list of productive interactions (Section 3.1) can be used as a template.

However, for interactions to be truly productive, they need not only to be efficiently coordinated, recurrent, and integrated with policymakers. In many cases the goal of science-for-policy interactions is to facilitate **learning** about policy issues and different solutions, options, and scenarios for action. Key features that facilitate learning across the ecosystem include:

1. A suitable mandate and joint vision, including a mandate to explore several alternative policy options in light of value diversity and uncertainty. For learning to take place, there needs to be flexibility for advisory institutions to formulate and communicate various possible outcomes and not only one majority recommendation.
2. Transparency and integration of diverse normative viewpoints and uncertainties in the assessment of policy issues and communication of policy options (manifesting the generic principle of diversity presented in Section 2).

3. Open, professionally moderated deliberation with sufficient time and intensity (recurrent interactions) to facilitate peer learning among the actors involved. Open and exploratory conversations are more likely to build trust among the key actors at the science-policy interface than closed and confidential advice.

Most productive interactions are likely to be few in numbers, contextual, and take place within fluid networks of knowledge exchange and co-creation. Since the purpose of the evaluation is to promote learning, integration, and coordination, it is important to assess not only the number and quality of interactions but also the learning outcomes they may or may not prompt. Inevitably, a healthy ecosystem consists of both weak and strong links between different stakeholders but what is important to consider is whether or not peer learning takes place within and across the different spheres of advice.

Lastly, the Review Panel should assess **learning outcomes and opportunities** for public engagement beyond the limited sphere of science-for-policy experts and stakeholders. In particular, the Review Panel should identify possibilities for broader stakeholder engagement in the shaping, organisation, and evaluation of evidence-informed policies. Engaging citizen groups, NGOs, or other interest groups is a foundational principle for a healthy ecosystem (Section 2), which foster system integration and enhance legitimacy (OECD 2022, SAPEA 2019). An ecosystem which is only based on highly effective in-group communication may be efficient but at the same time decoupled from public opinion and consensus building. Opening the ecosystem to public engagement and stakeholders outside the formal hierarchies of science and science advice can help enhance overall system performance and lead to a healthier ecosystem.

5 Proposed indicators

Based on the guiding principles presented in the prior sections, it is clear that any assessment of the national ecosystem of science-for-policy is primarily a **qualitative process** involving multi-facetted actors and institutions that are specific to each EU Member State. As has been noted in several European Commission working documents, evidence-informed policymaking does not lend itself easily to quantification (European Commission, Directorate-General for Structural Reform Support, Mackie et al. 2022). However, it is possible to identify some key elements of evidence providers that can be organised by categories and submitted to the Evaluator. Data submitted through self-assessment reports and templates may form the basis for benchmarking across the national ecosystem, and potentially across EU.

In the following sections, five tentative indicators are presented. They summarise key elements of the productive interactions framework introduced in Section 3. These building blocks for a science-for-policy indicator need further refinement and definition. Nevertheless, as an overall taxonomy for data collection they may be helpful in designing self-assessment reports as well as providing valuable quantitative data about overall system health. Each indicator is briefly introduced and explained by its rationale.

5.1 Direct interactions

For the purpose of the self-assessment report each individual institution included in the evaluation should collect and submit information regarding direct interactions with policymakers divided in two-subcategories: *formal* and *informal* direct interactions.

Table 5 shows the evaluation indicator that focuses on direct interactions between evidence providers and policymakers in its various forms.

Table 5. Evaluation form for the indicator on direct formal and informal interactions.

Indicator	**Direct formal and informal interactions**	
Definition	Across a reference period of 12 months, has your organisation interacted directly (formally or informally) with policymakers by providing advice or evidence?	
Response categories	Please tick one or more boxes in each of the following categories and provide any supporting explanatory information below each item where applicable.	
	1. ***Direct formal interactions,*** e.g., has your organisation been involved in:	
	1.1 Formal meetings with policymakers	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	1.2 Participated in formal advisory processes	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	1.3 Served as members of government commissions, etc.	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	1.4 Provided presentations for policy audiences following a formal invitation	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	2. ***Direct informal interactions,*** e.g., has your organisation been involved in:	
	2.1 Informal meetings with policymakers	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	2.2 Participated in informal advisory processes	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	2.3 Asked for personal or individual advice by members of government	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	2.4 Provided informal input, feedback, or assessment through informal contacts with policymakers	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	3. ***Duration of and/or recurrent direct interactions*** (please provide an estimate of the frequency of direct interactions for the reference period, and indicate if they are recurrent or stand-alone)	*Very frequent* ☐ *Frequent* ☐ *Occasionally.* ☐ *Rarely* ☐ *Very Rarely* ☐ *Data not available* ☐
	If the response to 1 and/or 2 is 'yes', please provide supporting information, including a description of how many, and the diversity of interactions (provide examples of meetings, presentations, events, panels, etc.), if possible.	

Source: Own elaboration.

5.2 Indirect interactions

In addition to direct interactions, each institution included in the evaluation should collect and submit information regarding indirect *external* and *internal* interactions with policymakers primarily focused on the production and dissemination of written outputs, statements, and artefacts used by the evidence provider to connect with policymakers. These include external interactions where a document or dataset is transmitted to a policy process, internal connectivity with other evidence providers and advisory groups within the ecosystem.

Table 6. Evaluation form for the indicator on indirect interactions.

Indicator	**Indirect interactions**	
Definition	Across a reference period of 12 months, has your organisation interacted indirectly with policymakers by providing written advice or evidence?	
Response categories	Please tick one or more boxes in each of the following categories and provide any supporting explanatory information below each item where applicable.	
	4. ***Indirect external interactions,*** e.g., has your organisation submitted or circulated:	
	4.1 Written digital or material products tailored for policymakers	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	4.2 Produced policy advisory reports or statements	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	4.3 Authored and co-authored policy papers	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	4.4 Produced and published policy briefings	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	4.5 Shared datasets with policymakers etc.	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	5. ***Indirect internal interactions***, e.g., has your organisation submitted or circulated	
	5.1 Written digital or material products	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	5.2 Advisory reports, statements, policy papers, briefings, or datasets that have been used by other evidence providers and advisory units within the national or international ecosystem etc.	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	If the response to 4 and/or 5 is 'yes', please provide supporting information, including a description of the frecuency of interactions, how many, and the diversity of interactions (provide examples of statements, reports, briefs, papers, datasets, etc.), if possible.	

Source: Own elaboration.

5.3 Financial interactions

Institutions under review should provide the Evaluator with information about financial interactions relevant for the provision of evidence to policy. Securing financial support for the different components of the ecosystem is an essential indicator of the chance of implementation of research in practice — and thus the potential policy relevance of advisory institutions. In this category of productive interactions, quantitative indicators are by nature easier to identify. This includes, for example, grants, contracts, instruments, programmes, and special sponsorships, such as policy fellowships and secondments etc.

Table 7. Evaluation form for the indicator on financial interactions.

Indicator	**Financial interactions**	
Definition	Across a reference period of 12 months, has your organisation received funding to promote the production and impact of evidence in policymaking?	
Response categories	Please tick one or more boxes in each of the following categories and provide any supporting explanatory information below each item where applicable.	
	6. ***Annual or multi-annual government funding*** (e.g., for permanent centres, bodies, earmarked positions, special budgets, fellowships, assignments, tasks, and contracts specifically designed to commission research to generate evidence for policy)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	7. ***Performance contracts between ministries and research institutes, centres, universities*** (e.g., funding dedicated to deliver specifically, agreed upon deliverables on a contractual basis subject to review etc.).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	8. ***Open calls to the research community to apply for funding for strategic projects to provide evidence for policymaking*** (e.g., funding allocated through research councils, public funding agencies, or special instruments, incl. strategic research programmes dedicated to policy support).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	9. ***Contracts announced to invited universities or other bodies to commission research*** (e.g., funding for centres, initiatives, or programmes tasked with generating evidence, advice or research support for policymaking).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	10. ***Government-sponsored research reports, meetings, or platforms that are intended to inform policy making*** (e.g., funding for specific advisory processes, publications, or policy programmes that need research support, for example digital research repositories, datasets, archives, publication series, workshops, conferences, hearings etc.)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	11. ***Small-scale grants for evaluating policy or delivering small-scale consultancy assignments*** (e.g., funding support for individual projects, consultancy, advisory functions, individual assignments, travel costs etc. relevant for producing and delivering evidence that informs policymaking.).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	If the response to one or more categories is 'yes', please provide supporting information, including a description of the different funding instruments and the estimated size, if possible	

Source: Own elaboration.

5.4 Staff interactions

One of the most prominent indicators of evidence-informed policymaking is the hiring or appointment of researchers and scientists in government. This is the background for the Anglo-Saxon model of the Chief Science Adviser but also the frequent use of policy fellowships and scientists seconded to governmental departments and parliaments (e.g., the AAAS science policy fellows, the Irish Public Service Policy Fellowship, UK-POST fellowships etc.). In principle, it should be quite straightforward to collect data on the hiring, appointment, and inter-sectoral mobility of staff – especially in cases where scientists are transferred or seconded from permanent academic positions within research institutions to assignments and fellowships in policymaking. Yet, these data might not be readily available and the main actors in the ecosystem could be helpful in collecting a more comprehensive account of joint appointments and mobility of staff.

Table 8. Evaluation form for the indicator on staff interactions.

Indicator	**Staff interactions**	
Definition	Across a reference period of 36 months has your organisation provided staff or engaged in joint appointments of scientists within the space of policymaking?	
Response categories	Please tick one or more boxes in each of the following categories and provide any supporting explanatory information below each item where applicable.	
	12. ***Government appointed scientists*** (e.g., has your organisation provided lead scientists to help steer or manage science advisory units within governmental departments, e.g., as secondment with option to return?)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	13. ***Joint appointments*** (e.g., has your organisation participated in the dual appointment of staff, with part-time roles as advisers or evidence providers within governmental units or offices?)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	14. ***Appointments of policymakers to serve as staff or executive board members in scientific advisory institutions*** (e.g., has your organisation hired or appointed former policymakers to lead or manage the production and provision of evidence to policymakers)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	15. ***Mobility programmes*** (e.g., has your organisation funded, supported, or organised mobility schemes to second scientists or evidence experts to become members of staff in government as part of a fellowship programme or similar temporary appointments).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	If the response to one or more categories is 'yes', please provide supporting information, including a description of the different staff interactions and the estimated volume of staff interactions, if possible.	

Source: Own elaboration.

5.5 Degree of openness, transparency, and collaboration

Finally, a fifth set of indicators for the evaluation of the national ecosystem of science for policy, focuses on the degree of **openness, visibility and collaboration** of advisory bodies and mechanisms. Contrary to purely quantitative numbers, this set of indicators needs weighted response from the evidence providers who may or may not have data about past and present performance. The degree of openness is to some extent covered by direct and indirect interactions, which are significant for the overall openness and accessibility of evidence for policy. Yet openness, have further characteristics, such as open publications, open datasets, open calls for experts, etc. Transparency figures centrally among the foundational principles for a well-functioning ecosystem of science for policy. However, it is difficult to quantify. The indicators listed in this section are exploratory and should be used experimentally to collect and analyse information.

Table 9. Evaluation form for the indicator on openness, transparency, and collaboration.

Indicator	**Staff interactions**	
Definition	Across a reference period of 12 months has your organisation performed on one or more of the following parameters when providing advice for policymaking?	
Response categories	Please tick one or more boxes in each of the following categories and provide any supporting explanatory information below each item where applicable.	
	16. ***Public availability of all evidence reports and advisory statements*** (e.g., on websites, repositories, searchable archives, etc.)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	17. ***Open declarations of conflict of interests***, when applicable (e.g., does your organisation have an explicit policy or code of conduct for transparency and integrity of advice and evidence to policymakers including public declarations of independence and conflict of interests etc.)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	18. ***Code of conduct*** (e.g., does your organisation, sector, or national association commit to a code of conduct for collaboration between evidence providers and policymakers, or any other guiding document with key principles for advice)	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	19. ***Joint programmes or project with other key evidence providers*** (e.g., does your organisation regularly or occasionally collaborate with other evidence providers in the national or international ecosystem through joint projects or programmes dedicated to providing evidence for policymaking).	*Yes (1)* ☐ *No (0)* ☐ *Data not available* ☐
	If the response to 18 is 'yes', please provide supporting information, including examples of collaborations and the estimated intensity (time, resources) of collaboration, if possible.	

Source: Own elaboration.

Based on responses and supporting material for the indicators 1-19, the Evaluator might be able to present the Review Panel with single-institution as well as cross-institutional analytics for assessing the state of the ecosystem. As was mentioned in Section 1 and Section 2, it is the task of the Review Panel to assess the overall system heath by unifying qualitative and quantitative information into a coherent assessment of system-wide connectivity and coordination. Emphasis should be placed on the overall diversity and coverage of structures and mechanisms to form an interactive and healthy environment.

The indicators listed in this section should not be used for single institution review but to get a better and more dynamic understanding of the coverage, frequency, and availability of different sources of evidence across the ecosystem, including the transparency, openness, and collaborative interactions of the system.

6 Conclusions

This report provides an evaluation framework for assessing science-for-policy ecosystems across EU Member States. The framework is focused on the fluid and dynamic nature of interactions between evidence providers and policymakers. To provide evaluators with inspiration and guidance, the report suggests a number of indicators, principles, and guidelines designed to facilitate the evaluation process and ultimately improve the performance and learning of the ecosystem.

A science-for-policy ecosystem consists of several instruments, functions, and mechanisms that operate at different levels of government and are characterised by different responsibilities, skills, and mandates. Evaluating the health of the advisory ecosystem requires evaluators to identify and assess both individual system components as well as system linkages across the science-for-policy interface. A healthy ecosystem is one in which the individual components interact in a dynamic and coordinated fashion, so that evidence is communicated and adapted in a way that leads to desirable social outcomes.

Whereas individual advisory bodies are regularly subject to performance reviews (as part of national research evaluations, funding proposals, or government assessment), the connectivity, coordination and learning across the ecosystem is rarely considered or evaluated. This guidebook helps to close this gap by providing actionable guidelines and methodologies for assessing cross-institutional performance. The guidebook is less focused on static measures of impacts and more focused on the processes that are expected to lead to impact, e.g., establishing productive interactions and creating platforms for different actors to improve the use of evidence in practice.

Implementing the proposed indicators and guidelines in EU Member States will require further dialogue at the national level. This report explores what an assessment framework underpinning ecosystem health could look like. However, the report acknowledges that the final form of such an evaluation depends on the specific configuration of instruments and mechanisms in the national ecosystem. The report proposes a framework that is based on a mixed qualitative and quantitative approach. In this "narratives-by-numbers" approach, the individual advisory bodies will have the opportunity to explain how they reach impact and contextualise their performance with reference to the systemic health of the ecosystem.

The immediate policy context for this work is provided by the recent Commission Staff Working Document on "Supporting and connecting policymaking in the Member States with scientific research" (European Commission 2022) and the December 2nd, 2022 meeting of the Competitiveness Council of the EU, which called for further discussions of how "science as an instrument facilitate policymaking in the Member States". However, for a renewed EU agenda for evidence-informed policymaking to attain its full potential, it is essential to first evaluate how current Member States' ecosystems function, how evidence is produced and circulated at the national level, and to what degree system components and links can be improved to foster integration, coordination, and learning.

Glossary

Augmentation: Technical term used in the report. It designates the specific process of producing, circulating, and translating evidence in policy and practice. Rather than a linear model of knowledge diffusion – according to which formal knowledge is transmitted from agent A to agent B – augmented knowledge describes the piecemeal adaptation and integration of evidence in policy. This is a dynamic process in which knowledge is transformed and formatted for specific policy audiences, often involving co-creation and co-production across advisory and policy bodies.

Evaluation framework: Term used in the report to describe a unified set of guidelines, principles and indicators used for evaluation of science-for-policy ecosystems. A framework entails a comprehensive account of the activities, plans, and actions taken by the Evaluator to conduct a coherent and valid evaluation. The term evaluation framework is used interchangeable with assessment framework, evaluation design, evaluation process etc.

Evidence-informed policymaking (EIPM): Term used in the policy and academic literature to describe advisory activities that share the broad goal of increasing and/or improving research evidence in policy. The extensive literature on the topic focuses on several dimensions of evidence-informed policymaking, e.g., delivery of evidence (how different forms of knowledge reach decision-makers), relevance of evidence (how framing of policy problems dictates what is considered relevant), robustness of evidence (methodological design, validity, and transparency), and absorption of evidence (integration of evidence with values, beliefs, and economic and social doctrines in decision-making).

Guidebook: A document that gives information about a place, such as a city, region, or country. Guidebooks usually start with an introduction to the area. The introduction sketches the main characteristics of the place. Often, this sketch is followed by more background information and a step-by-step outline of how to navigate the area. In this report, the term guidebook is used to guide evaluators of national science-for-policy ecosystems. The term is used interchangeable with report.

Qualitative and quantitative methods: Two distinct analytical and scientific approaches to studying the social reality. Quantitative research is often used to test hypotheses, identify patterns, and make predictions across smaller or larger numerical datasets and outputs. Qualitative research, on the other hand, is based on non-numerical data and focuses on exploring subjective experiences, opinions, and attitudes, often through observation and interviews.

Science advice: Term broadly used in the policy and academic literature to describe advisory activities that offered guidance by one person or organisation to another as to different options or actions. Advice can be solicited or unsolicited. Science advice for governments are most often mandated and organised by formal structures but can also be performed informally in person or by 'shadow science advice' originating from several competing sources of policy-relevant evidence.

Science-for-policy ecosystem: Metaphor adapted from biophysical ecosystems in which individual components, functions, and mechanisms interact in dynamic and emergent ways. Likewise, a national ecosystem of science for policy consists of an interlinked set of institutions, structures, mechanisms, and functions that interact at different levels to provide scientific evidence for policy. The terms is used interchangeable with 'advisory ecosystem' and 'evidence ecosystem'.

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