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Science-for-policy ecosystems through the eyes of professionals

A multi country survey analysis

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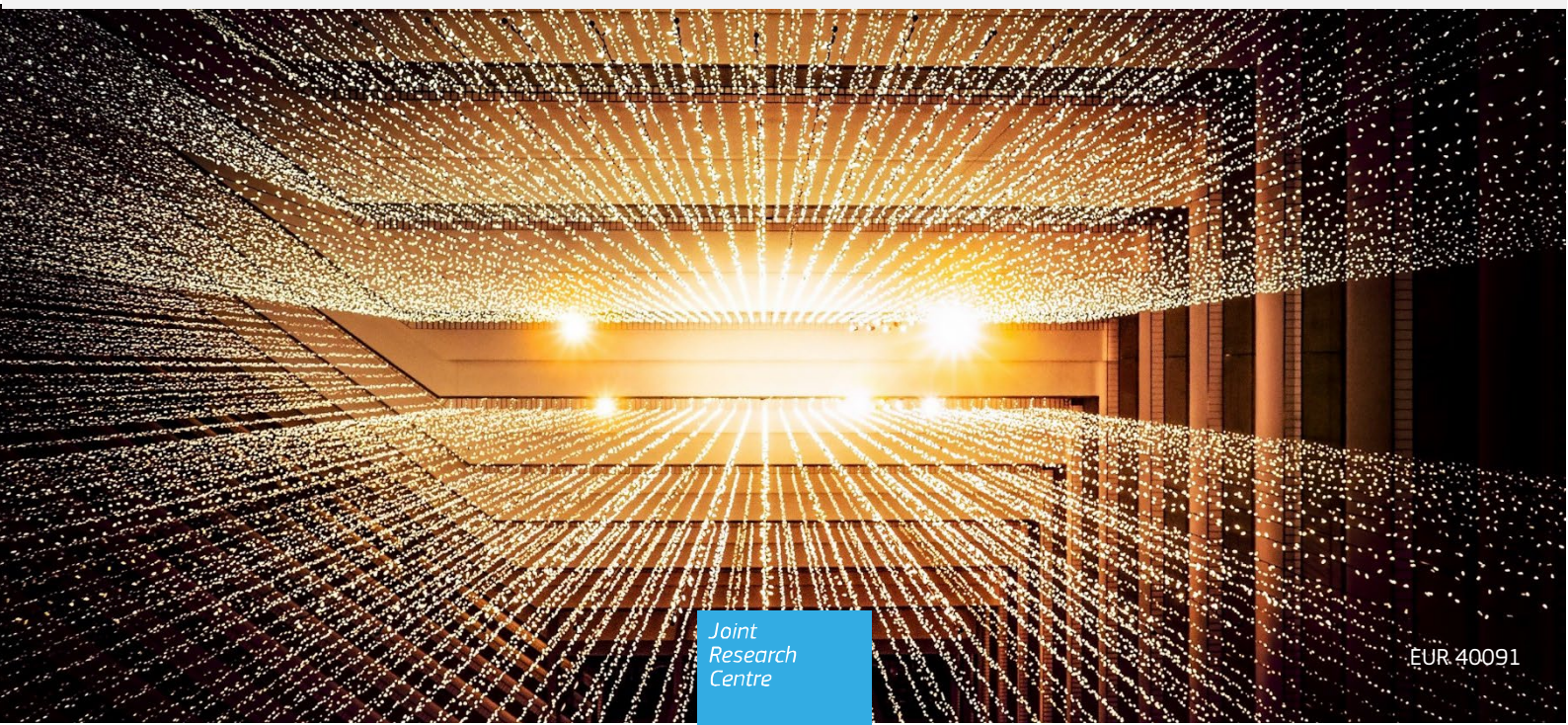

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Contents

Abstract

This Joint Research Centre science for policy (S4P) report explores the perceived challenges for establishing and maintaining a well-functioning science–policy interface in the EU. To gather this information, a survey was conducted with around 500 S4P professionals from 22 EU Member States. Respondents to the survey identified a fragmented S4P ecosystem and lack of meeting opportunities as the main challenges for effective collaboration between policymakers and scientists. There is a general readiness to provide and utilise scientific knowledge, but the lack of a systematic approach to bring both sides together seems to hinder this process. The results point to substantive agreement across professional groups (knowledge producers, users and brokers) on the need for improvements, in particular concerning better skills, knowledge translation capacities and institutional support, to enhance S4P ecosystems. The limited sample size of the survey and the non-probabilistic sampling strategy employed means that the data do not show a fully representative view of European S4P professionals' perspectives. Yet, they provide an entry point for exploring and guiding future perspectives of European S4P ecosystems. The report's findings provide valuable insights for national and EU policy discussions on enhancing the use of science in policymaking, which can concretely help guide efforts to support S4P ecosystem-building activities, enhancing the translation capacities of scientists and knowledge brokers, and increasing the skills and competences of policymakers. The report also contributes to the European Commission's recent initiatives to strengthen the connections between policymaking and scientific communities, as seen in the emerging research and public administration policies.

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Executive summary

Policy context

Policymaking is a formidable task. Accurately describing and effectively tackling the 'wicked' and complex problems the world is currently facing, such as climate change, biodiversity loss, global pandemics, societal polarisation and the challenge of artificial intelligence, requires unprecedented levels of scientific knowledge and expertise.

The demand for a better use of science for policy (S4P) is widely recognised by Europe's citizens. Almost 7 out of 10 Europeans – according to a Special Eurobarometer survey from 2021 – agree that scientists should intervene in political debates to ensure that policies are based on scientific evidence (European Commission: Directorate-General for Communication, 2021). This demand is reflected in evolving policy frameworks and institutional configurations at the EU level that shape the production, transmission, absorption and use of scientific knowledge for policymaking.

Recent efforts in this regard include the revamping of the 'Better Regulation' agenda, which defines the overarching framework for EU policymaking (European Commission 2023a). In a communication introducing an update of the Better Regulation guidelines and toolbox, the Commission identified scientific evidence as 'vital to establishing an accurate description of the problem, a real understanding of causality and therefore intervention logic; and to evaluate impact' (European Commission, 2021a).

Likewise, a Commission Staff Working Document (SWD), developing a vision on 'public administration for the present and the future', states that 'a systematic consideration of scientific knowledge enables governments and public administrations, for example, to define and analyse policy challenges from multiple perspectives *[…], and develop a set of policy options based on multi-disciplinary scientific input […].* To ensure that scientific knowledge informs public policies and services, robust structures, procedures, and competences need to be further developed and connected at all levels of public administrations and policymaking *[…] and to provide training opportunities in data literacy to policymakers*' (European Commission, 2021c).

This evolution on the knowledge-user side is also reflected in the policies shaping knowledge production. In December 2020, the Council of the European Union adopted its conclusions on the relaunch of the European Research Area (ERA), stating that Research and Innovation (R & I) activities are an 'essential input to address societal challenges and constituting a cornerstone of value- and evidence-based policymaking and thus of our European democracies' (Council of the European Union, 2020). This emerging policy on knowledge valorisation includes the uptake of scientific knowledge in policymaking. In parallel, the European Commission called on EU Member States, policymakers and other relevant stakeholders to 'strengthen structures, processes, and practices in the use of research results and scientific knowledge for designing and implementing public policy' (European Commission, 2022a). This is also reflected in the Public Administration Skills Agenda launched by the Commission communication on 'Enhancing the European Administrative Space (ComPAct)', which emphasises the need to build more resilient, attractive, transparent and high-performing public administrations in Member States, including through developing tools and skills to make use of scientific knowledge and evidence (European Commission, 2023b). Finally, bringing demand and supply sides together and complementing them by a special interest in 'boundary-spanning' organisations, the Commission has published a SWD on supporting and connecting policymaking in the Member States with scientific research (European Commission, 2022b), which builds also on the preliminary insights from the survey discussed in depth in this report.

All this work is part of a wider European discussion on how to make better use of scientific knowledge in policymaking. These discussions have recently been taken up in Council conclusions on strengthening the role and impact of R & I, which emphasise 'that all fields of science, including social sciences and humanities, by producing evidence-based knowledge, should play a more significant role in the policymaking process for the identification of political challenges, the analysis of the state of the art, the framing of the solutions. (Council of the European Union, 2023).

This Joint Research Centre (JRC) science for policy (S4P) report builds atop of these initiatives, providing relevant evidence to inform ongoing policy discussions, at both the national and European levels, on the challenges

related to establishing and maintaining a well-functioning interface and building a European S4P ecosystem ([1]). It does so by surveying policymakers, scientists and knowledge brokers from several Member States in the EU with experience at the S4P interface, asking them what they perceive as the main challenges in building a better functioning S4P ecosystem. Results from this survey, while only partially representative of the wide range of institutions and organisations involved in the emerging European S4P ecosystem, are discussed and contextualised to provide an initial assessment of the qualities of these ecosystems. Despite the limited reach of the survey conducted, the report paves the way for more systematic efforts to map the S4P ecosystems within and across the EU to better understand their qualities and related challenges.

Main findings

Around 500 S4P professionals from 22 Member States responded to the JRC survey on the qualities of science for policy ecosystems, which aimed to identify needs and gaps preventing the effective functioning of the science–policy interface. These professionals belong to knowledge-producer, knowledge-user and knowledge-bridging organisations, thus rendering this survey a unique source of evidence that takes into account the multiple perspectives involved in S4P activities in Member States. Building on these data and ongoing work at the JRC, this report offers an exploratory analysis of the qualities of S4P ecosystems and of existing challenges at the science–policy interface, through the eyes of S4P professionals.

Overall, the professionals surveyed agree on the existence of crucial challenges in S4P ecosystems, reflected in widely shared perceptions that certain 'qualities of science for policy systems' are lacking. The most important issue for S4P professionals is lack of meeting opportunities between producers and users and a fragmented S4P ecosystem. There is a readiness on all sides to provide and utilise scientific knowledge, which seems to be hampered by a lack of a systematic approach to bringing both sides together.

Closely behind the fragmented ecosystem and lack of meeting opportunities comes the perceptions that policymakers face political constraints in what they can take on board, that policymakers lack skills for science uptake and, on the other hand, that science is often not fit for purpose. System-building activities should be supported by work on the translation abilities of scientists or knowledge brokers, as well as the absorptive capacity and skills of policymakers.

In addition, when zooming in on professional sectors, whether knowledge-producer, knowledge-user or knowledge-brokering organisations, the responses to our survey remained largely consistent, showing general consensus among respondents about the need for a better S4P ecosystem. Nevertheless, there are some statistically significant differences among the professional types, notably with knowledge-broker professionals having the most critical perspective of the functioning of the S4P ecosystem. At the country level, discrepancies between professionals' responses were larger, but given the small sample sizes more evidence would be needed to support this conclusion. Due to the specific circumstances under which the survey was carried out, the distribution of national affiliations in the sample is somewhat unbalanced, with a strong prevalence of respondents from a few countries, inviting some caution in interpreting cross-country pattens.

Related and future Joint Research Centre work

This report contributes to a better understanding of S4P professionals' perceptions of needs and challenges in terms of the normative foundations and institutional underpinnings of S4P ecosystems, as well as the skills and competences needed and the mechanisms for better connecting actors and organisations in both research and public administrations. These results have informed the European Commission's actions on S4P, such as its production of a SWD on supporting and connecting policymaking in the Member States with scientific research (European Commission, 2022b). They also attest the relevance of JRC's work on evidence-informed policymaking, both at the EU level and in Member States, and can inform further actions to strengthen national ecosystems. At the same time, the report paves the way for further research and actions in relation to consolidating the European S4P ecosystem.

([1]) As defined in Commission staff working document – Supporting and connecting policymaking in the Member States with scientific research (SWD(2022) 346 final), an S4P ecosystem is a complex of organisational structures and entities, processes and networks that interact to support the mobilisation, acquisition, synthesis, translation, presentation for use and application of scientific knowledge in policymaking processes.

1. Introduction

Today's policy problems are complex and multifaceted, with far-reaching implications across various sectors and policy fields. Issues such as the global COVID-19 pandemic, climate and environmental emergencies, advances in artificial intelligence and other technologies, and the global expansion of divisive social media platforms – and with it increased societal polarisation – all have profound implications across many sectors, policy fields, and socioeconomic, professional and demographic groups. To respond to these challenges effectively, governments and public administrations need to mobilise significant analytical and knowledge resources.

However, much of the knowledge and analytical capacity is situated outside administrations. In fact, scholars have observed a declining analytical capacity of public administrations and an increasing trend towards the externalisation of science advice provision, associated with different factors, including public sector reforms and reduced budgets, attempts by politicians to impose greater control over bureaucracies by diversifying knowledge inputs, and the emergence of 'wicked' problems that have undermined the perceived capacities of internal advisory systems to provide solutions (Craft and Howlett, 2013).

While relevant knowledge can be found in many organisations and professions (e.g. industry bodies, non-government advocacy organisations, professional associations, learned societies), a special role has been assigned in policy debates (European Commission, 2021a, b, c) and academic research (Pielke, 2007; Gluckman, 2014; Cairney, 2016; Parkhurst, 2017) to high-quality scientific knowledge.

Scientific knowledge is understood as all knowledge (data, information, etc.) that is available and has been tested through the use of scientific methods. Its production involves gathering knowledge from all disciplines of sciences (including social sciences and humanities), obtained through a process based on methodological rigour, agreed rules of enquiry, systematic search for evidence and continuous review and debate; in fact, claims are subject to peer review before being made publicly available and open for scrutiny and processes of verification or falsification. Although methods for gathering knowledge should be systematic and valid across contexts, they can also be case specific and context dependent (SAPEA, 2019). Looking at the EU Member States, the capacity to produce scientific knowledge is impressive. In the EU, there are almost 1.9 million researchers, and the EU's share of global scientific publications was 21 % in 2020, including a large share of the top 1 % highly cited scientific publications.

Dealing with wicked problems, which are by definition hard to fully analyse and where scientific evidence provides only limited insights into the many dimensions involved, requires even more careful consideration of the evidentiary basis that informs and supports policymaking. Scientific evidence in this context could be better seen as speaking to, rather than a substitute for, controversies in society about the right way of policymaking (Daviter, 2019). Therefore, there is a need for better interactions between scientists and policymakers, allowing for the contestation, updating and enhancing of evidence-informed policymaking to go beyond the linear model of knowledge uptake.

Given this capacity of scientific communities, the increasing demand for analytical and scientific expertise by policymakers and the need for interaction on complex policy challenges, it is important to examine if and if so how effectively policymakers can make use of science in policymaking processes, and what the potential challenges are at the science–policy interface.

Potential challenges have been presented from different conceptual perspectives.

— From the **normative democracy theory perspective**, there are concerns about the democratic accountability of technocracy (Habermas, 1973; Bertsou and Caramani, 2020), the scientisation/depoliticisation of politics (Weingart, 1999; Christensen and Lægried, 2022), conflict of interests in the use(s) of science, and stealth advocacy issues and their potential impact on regulatory affairs (Jasanoff, 1990; Pielke, 2007). Furthermore, studies embracing this perspective have emphasised a lack of deliberative democratic systems in place that ensure sufficient openness and diversity of scientific and non-scientific views for informing policymaking processes (Parkinson and Mannsbridge, 2012; Moore, 2018).

— From a **problem-driven perspective**, many complex societal problems are 'wicked' issues, where values and facts are often entangled, science about their causes and potential solutions uncertain, and political stakes large. This limits the capacity of science in its traditional form to be useful and calls for post-normal science, which is based on the transdisciplinarity and democratisation of science (Funtowicz and Ravetz, 1993; Renn, 2021). The issue can also be seen through a lens of problem structuredness and (political) distance between the scientific evidence generation and the overarching problem, such that the need for

partitioning of a policy problem in solvable smaller problems is itself a political action (Peters, 2017; Turnbull and Hoppe, 2019).

— From an **institutionalist perspective**, scholars point to the existence of 'two communities' (Caplan, 1979) – the scientific and policymaking communities – which tend to operate with different 'cultures', incentives, processes and objectives. This divergence in logic of operation would also explain fundamental misunderstandings of policymaking among those operating/analysing at the science–policy interface, including simplified assumptions from the scientific community around cognitive and institutional processes involved in policymaking (Oliver and Cairney, 2019; Strand, 2022). Likewise, public administrations also need an evidence-based culture, calling for administrations that are open to the evaluation of, experimentation with and use of scientific knowledge, as well as data-driven policymaking, all of which could improve the forward-looking policymaking behaviour of administrations in areas where scientific knowledge is scarce or undetermined (Global Commission on Evidence to Address Societal Challenges, 2022).

Several of the challenges at the science–policy interface, considered on a more conceptual level, can be assumed to manifest themselves along interconnected dimensions. Building on existing literature and insights from hands-on exchanges with science for policy (S4P) professionals, this report analyses four main dimensions or 'qualities' of S4P ecosystems.

1) **Productive interactions.** Does the S4P ecosystem have the qualities needed to deliver the right inputs for S4P?

   Challenges in this area concern the logistics of the engagement between the knowledge producers and users (Budtz Pedersen and Hvidtfeldt, 2021; Budtz Pedersen, 2023). Relevant questions in this regard are centred around whether research needs are formulated clearly and whether science can deliver on policymakers' demands of knowledge for policy.

2) **Individual competences.** Does the S4P ecosystem have the qualities needed to ensure that policymakers and scientists have (or can develop) the right competences (knowledge, skills, attitudes)?

   The key challenges in this area involve core competences of individuals at the science–policy interface. Do scientists produce information on time and in the right format? Is scientific knowledge presented in a manner useful for policy use? Are policymakers asking relevant questions to scientists? Are policymakers consulting a sufficiently broad/diverse knowledge body as well as stakeholders?

3) **Institutions and resources.** Does the S4P ecosystem have the qualities needed to provide institutional and resource support?

   As S4P requires a deeper engagement between knowledge producers and users, for S4P activities to respond to problems that are increasingly less structured, more wicked or happening at a further distance from decision-making, a crucial challenge concerns the existence of an enabling institutional set-up (Budtz Pedersen, 2014; SAPEA, 2019). Such institutional structures need to be supported by adequate resources, allowing policymakers, scientists and knowledge brokers to interact sufficiently well.

4) **Normative foundations.** Does the S4P ecosystem have the qualities needed to promote advice that recognises and promotes the democratic policymaking processes?

   Recognising the complexity of today's problems requires more than the coordination of a plurality of actors, knowledge bodies and processes. From this perspective, key questions concern the rules and principles underlying science–policy interactions, as well as the issue of trust within S4P ecosystems. This touches on aspects of sectoral specificities that may interfere with (or strengthen) such interactions (e.g. the 'politics' on the policy side, questions of independence and incentives on the science side), trust and mutual appreciation between the communities, and each community's familiarity with the other (Douglas, 2009).

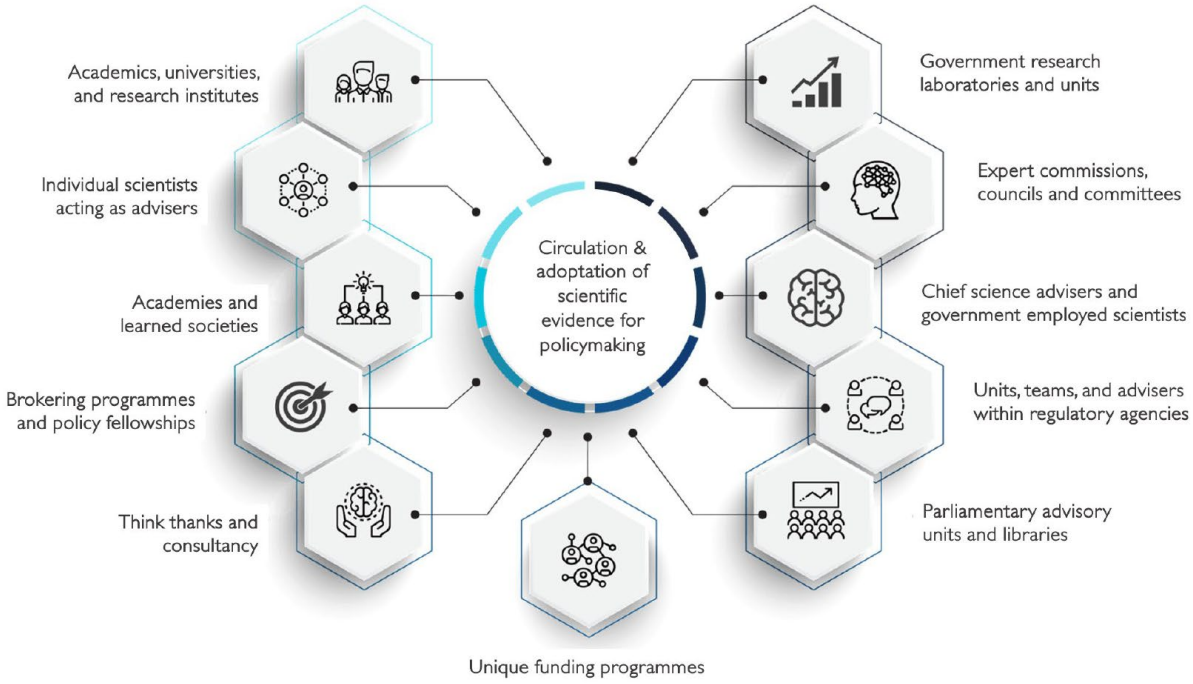
These four dimensions focus on the idea that the scientific and the policymaking communities are respectively providing and using evidence directly. While interactions at the science–policy interface are often conceived in terms of these two broad communities, recent research points towards an important third type of actor, variously defined as knowledge brokers, intermediary organisations or boundary spanners. Productive interactions can be mostly addressed together with the improving competences dimension within each community (Schwendinger et al., 2022). Addressing institutions and resource challenges, however, concerns building institutional bridges between key players (Gluckman et al., 2021), creating boundary organisations

(Guston, 2001) and professionalising 'boundary spanners' or 'honest brokers' (Pielke, 2007; Bednarek et al., 2018; Neal et al., 2022). The issue of normative foundations, instead, calls for a broader reflection on the underlying values and rationale for evidence-informed policymaking. Acting on normative foundations requires developing an approach to the good governance of evidence use (Parkhurst, 2017), which should always be seen as embedded in democracy, requiring contestation not only from within, on the technocratic side, but also from an ethical and values perspective (Douglas, 2009; Scharfbillig et al., 2021). All these elements can facilitate common understanding, mutual learning and co-creation for research projects, to cover policy needs or evidence gaps and make policymaking processes more responsive to citizens' needs and more resilient to the effects of fake news and misinformation (Smillie and Scharfbillig, 2024).

Some scholars have assessed the qualities of the science–policy interface by analysing either the supply side of evidence or scientific advice (Howlett, 2019) or the demand side (Manwaring, 2019). However, few studies have explored the views/perceptions or experiences of those working on both sides and across the boundaries of the S4P ecosystem or policy advisory systems to discern the qualities they have and challenges they face. Existing analyses of the interplay between academics and policymakers in Belgium and Germany (Pattyn et al., 2022) and the United Kingdom (Talbot and Talbot, 2014) underline the value of new institutional arrangements and increasing trends of the pluralisation, professionalisation and politicisation of policy advice. As these cases show, there is much to learn from involving both sides simultaneously, rather than analysing the sides in isolation.

Furthermore, S4P practices and capacity involve a wide range of organisations that produce and use relevant services and outputs, including generating, requesting, synthesising, translating, transmitting, communicating, absorbing and using scientific knowledge for policymaking, as well as training and engaging the professional communities involved/operating at the science–policy interface (Spruijt et al., 2014; Gluckman et al., 2021; Oliver, 2022) (Figure 1).

Figure 1. Actors in the S4P ecosystem



Source: Budtz Pedersen (2023).

This report builds on the S4P capacity-building initiatives carried out by the Joint Research Centre (JRC) ([2]), which included a number of interactive workshops, with the participation of high-level actors from the scientific

([2]) https://europa.eu/!rKdpjd.

and administrative sides in several countries ([3]) and the publication of discussion papers mapping the S4P ecosystems in some of the participating countries, including Denmark (Budtz Pedersen and Hvidtfeldt, 2021), Greece (Ladi et al., 2022), France (Maxim, 2022), Portugal (Simões, 2022), and Spain (Cañibano and Real-Dato, 2024).

As part of these initiatives, the JRC conducted a survey based on an open call for participation, with almost 500 professionals working at the science–policy interface responding from 22 Member States. This report describes the main findings of the survey and offers a timely contribution to the ongoing debate on the science–policy interface, exploring the perspectives of professionals on both the demand and supply sides in relation to the qualities, needs and challenges of different S4P ecosystems across Europe. While the sample set from each country may not be large enough to be representative, meaning that a cautious approach to cross-country comparison is needed, perspectives from the supply, demand and brokerage sides can be compared with greater confidence.

Questions were formulated to identify the views/perceptions of respondents on issues related to the S4P ecosystem that could be improved. To analyse the answers obtained, three approaches were used.

1. **Describe common/shared problems.** Explore descriptive patterns across the entire group of respondents to identify patterns of agreement on common/shared problems at the science–policy interface.
2. **Compare perception among professionals.** Compare perceptions between knowledge users, knowledge producers and other intermediary knowledge organisations (knowledge brokers) in their responses.
3. **Compare countries.** Compare countries to identify patterns and variations in problem perceptions to better inform capacity-building work and explore linkages between perceptions of problems and country-specific settings of science and policy institutions. Note, however, that these results should be interpreted with caution due to the small number of responses per country.

The report's contribution is relevant at both the theoretical and practical levels. First, the report provides an initial assessment of S4P ecosystems, connecting the dots between the different actors' perspectives on both the supply and demand sides, as well as the perspectives of knowledge brokers, and exploring their interpretations of the main challenges and weaknesses of national S4P ecosystems. These data complement the quantitative indicators of S4P capacity (e.g. the OECD's Better Regulation iReg indicators, human resource data of public administrations, and Eurostat research and development (R & D) statistics on the employment of R & D staff) through mobilising the collective intelligence of professionals working at the science–policy interface. Second, the analysis of the survey provides insights that may help prioritise investments and reform efforts, in particular by enabling them to be tailored to the needs of the science–policy professionals of individual countries and sectors. The initial assessment presented in the report may also offer guidance for further research in this area.

([3]) A total of 15 workshops were held between September 2020 and September 2023, nine of which focused on the analysis of national S4P ecosystems, with the six remaining dealing with cross-cutting issues at the science–policy interface, such as legislative science advice, governmental science advice, the role of universities and funding sources. More information is available online (https://europa.eu/!jW9NXq).

2. Methodology

This S4P report builds on the analysis of an online survey distributed via an open call by the JRC ([4]) to professionals at the science–policy interface during the organisation of several, including country-specific, workshops ([5]). This call was widely disseminated on social media via institutional channel profiles (mostly LinkedIn and Twitter). The answers were collected for 17 months, from January 2021 to May 2022.

The survey (https://europa.eu/!GdHRK6) was organised in two parts. The first part ('About you') included questions regarding nationality and professional activity. The second part ('About the qualities of science for policy/advice ecosystems') contained 20 statements to which respondents had to indicate their level of agreement on a 1–5 Likert scale (strongly disagree (1), somewhat disagree (2), neither agree nor disagree (3), somewhat agree (4) and strongly agree (5)). Statements were linked to the four analytical dimensions previously mentioned: productive interactions, individual competences, institutions and resources, and normative foundations (Table 1).

For the purpose of empirical analysis and to better identify common shared problems or needs across the dataset, the statements that were phrased in positive terms (e.g. 'Scientific knowledge is synthesised, translated and formatted in a way in the ecosystem that policymakers can use it easily') were reverse coded to identify needs and gaps.

([4]) General information (https://europa.eu/!RpBb4W) and the survey form (https://europa.eu/!GdHRK6) can be found online.

([5]) Country-specific workshops were held for Belgium, Denmark, Estonia, Greece, France, Latvia, Lithuania and Portugal. More information is available online (https://europa.eu/!jW9NXq). Another workshop was held for Spain in 2023 as part of this series but the survey was no longer open for responses.

Table 1. Survey dimensions and short versions and full-text versions of survey statements

Dimension	Short version	Full-text statement
Productive interactions	Not the right question	Scientists receive questions from policymakers and knowledge brokers framed in such a way that they can provide useful evidence-informed inputs (rev)
	Science not timely	Scientific knowledge is often not available at the right moment in time to be useful for policymakers
	Science not fit for purp	Scientific knowledge is synthesised, translated and formatted in a way in the ecosystem that policymakers can use it easily (rev)
Individual competences	PMs lack skill	Policymakers have the skills to broadly understand and critically appraise scientific evidence and arguments (rev)
	PMs cannot differentiate	Policymakers recognise the difference between scientific knowledge and stakeholder opinions and other forms of analyses (rev)
	PMs not diversified demand	Policymakers seek out broad and diverse scientific knowledge, not only a single expert/study, to inform their policy deliberations and design (rev)
	PMs do not appreciate	Most policymakers appreciate the unique value of scientific knowledge for policymaking (rev)
	PMs lack ecosys knowl	Policymakers know which scientific institutions and knowledge brokers in your country can provide evidence and analytical capacities to address their questions (rev)
	SCs are not appreciated	Scientists can expect recognition, rewards and/or support for science for policy/advice work by their employers, funders and peers (rev)
Institutions and resources	Lack meeting opp	Scientists and policymakers lack regular and well-supported opportunities to meet and exchange ideas
	Lack funding	Lack of funding for science for policy / science advice structures and activities is the main obstacle to evidence-informed policymaking
	Ecosystem is fragmented	The science for policy / science advice ecosystem is fragmented: in general organisations rarely coordinate their activities and are often not aware of each other's activities
	Difficulty new entry	It is very difficult for newly interested organisations and individuals to join science for policy / science advice processes and existing structures
	SCs lack org	Scientific organisations have set up dedicated organisational structures and processes to share scientific evidence with policymakers (rev)
Normative foundations	No mutual trust	Policymakers do not trust scientists (and vice versa)
	Roles & process not clear	Roles and processes within the science for policy / science advice ecosystem are clearly formalised (clear mandates, institutionalised mechanism, etc.) (rev)
	Lack transparency	Processes of production and use of scientific knowledge are not transparent to the public in the science for policy / advice ecosystem
	PMs are constrained	Policymakers are strongly constrained in their ability to take science knowledge on board and often need to prioritise other considerations (balancing regional interests, etc.) instead
	PMs use to justify	Policymakers tend to use scientific knowledge to justify (*ex post*) their decisions rather than inform them (*ex ante*)
	SCs not independent	When participating in policymaking, scientific experts remain independent from the influences of policymakers (rev)

NB: PM, policymaker; rev, statements that have been rephrased at the time of data analysis to reflect needs or challenges; SC, scientist.
Source: Own elaboration.

We asked participants to select their professional occupation, and we regrouped responses into three main groups, based on participants' roles in terms of knowledge exchange, that is, as knowledge producers, knowledge users or knowledge brokers (Table 2). These three labels were assigned *ex post* based on respondents' professional occupations and, thus, do not correspond to participants' self-identification as producers, users or brokers, which might have been different, in some cases, depending on the national contexts (i.e. the role of academies of science can, in some cases, be more akin to that of knowledge producers than knowledge brokers). However, such categories are consistent with existing literature (Duncan et al., 2020; Budtz Pedersen et al., 2023) and allow us to explore the different perceptions of the qualities and needs of S4P ecosystems. Respondents fulfilling many roles had the option to select several answers, but for the purpose of data analysis their first answer was the only one considered.

Table 2. Respondents by professional group

Knowledge producers	Knowledge users	Knowledge brokers
Primarily involved in producing scientific knowledge	Primarily involved in using scientific knowledge	Primarily providing services to transmit and translate scientific knowledge for policymaking
Universities and higher education institutions; public research performing institutions	Government/public administrations at the national level; government/public administrations at the subnational level; government/public administrations at the EU or international level; parliaments	Academies of science; think tanks; business organisations; not-for-profit civil society organisations; other

Source: Own elaboration.

Respondents were asked to select their nationality and which countries they were referring to when answering questions regarding the S4P ecosystem. For the country comparisons, only countries that had received more than 30 responses each were included in the analysis. These were Denmark, Greece, Spain, France, Lithuania and Portugal.

Several limitations need to be accounted for in the sampling strategy. First, the sample size is not representative but self-selected by interest to engage with the EU on questions around S4P. Therefore, participants were more likely to be interested in the topic of S4P, more likely to be interested in international affairs and from certain countries (the survey was available in only English) and more likely to be interested in workshops on bridging the gap between science and policy, and thus already likely to consider scientific advice valuable for policymaking (which may be more selective for policymakers than scientists). Second, the sample was still relatively small, especially for the country-specific analysis and comparisons, such that group comparisons should be assessed with consideration being given to the small number of observations per category. Third, our clear-cut separation between professional occupations in terms of supply and demand may have resulted in the mis-categorisation of some profiles (e.g. knowledge producers working inside government / public administration bodies being categorised as knowledge users) and the conflation of knowledge-broker organisations in the categories of either knowledge producers or users, due to the country-specific characteristics of S4P ecosystems. Finally, several participants have long-term experience at the S4P interface and have possibly changed their role in their career over time; thus, their answers identifying their current organisation may be misleading.

3. Results and discussion

The report analyses the responses obtained from a survey on the qualities of and challenges for S4P ecosystems, with responses being from scientists, policymakers and other practitioners (e.g. knowledge brokers) working at the science–policy interface. The analysis identifies shared problems across the whole sample (Section 3.1), variation in perceptions according to professional group (Section 3.2) and variation in perceptions in those countries with more than 30 responses (Section 3.3).

The results highlight how professionals working at the science–policy interface interpret the qualities of S4P ecosystems and the challenges that need to be addressed to improve evidence-informed policymaking. In particular, our data suggest that S4P ecosystems are largely perceived as being fragmented and that better coordination between scientists and policymakers, in terms of opportunities and mechanisms for exchanging ideas and favouring cooperation and coordination, is essential. The exploratory findings highlight the need to explore all dimensions of science advice but mostly the need to go beyond the most direct 'productive interactions' of timely and appropriate questions and look more in depth at the institutions, normative foundations and competences, which have received less attention than other aspects of science advice in the literature.

3.1. Shared problems related to the quality of science for policy in Member States

3.1.1. Sample description

A total of 498 respondents were surveyed. The majority (317 respondents, equivalent to 64.7 % of the total sample) were concentrated in six countries, namely Portugal (103, 20.7 %), France (75, 15.1 %), Greece (41, 8.2 %), Denmark (34, 6.8 %), Spain (33, 6.6 %) and Lithuania (31, 6.2 %). The remaining respondents were grouped under 'EU Other' (181, 36.3 %) ([6]). Their distribution across countries and professional groups is shown in Figure 2 and Table 3.

Table 3. Summary of respondents by country and professional group

	Knowledge producer, *n* (%)	**Knowledge user, *n* (%)**	**Knowledge broker, *n* (%)**	**NA, *n* (%)**	**Total**
Denmark	19 (55.9)	8 (23.5)	5 (14.7)	2 (5.9)	**34**
France	36 (48.0)	32 (42.7)	6 (8.0)	1 (1.3)	**75**
Greece	12 (29.3)	19 (46.3)	10 (24.4)	0 (0)	**41**
Lithuania	16 (51.6)	13 (41.9)	2 (6.5)	0 (0)	**31**
Portugal	53 (51.5)	31 (30.1)	15 (14.6)	4 (3.9)	**103**
Spain	14 (42.4)	11 (33.3)	8 (24.2)	0 (0)	**33**
EU other	78 (43.1)	58 (32.0)	42 (23.2)	3 (1.7)	**181**
Total	**228 (45.8)**	**172 (34.5)**	**88 (19.7)**	**10 (2.0)**	**498**

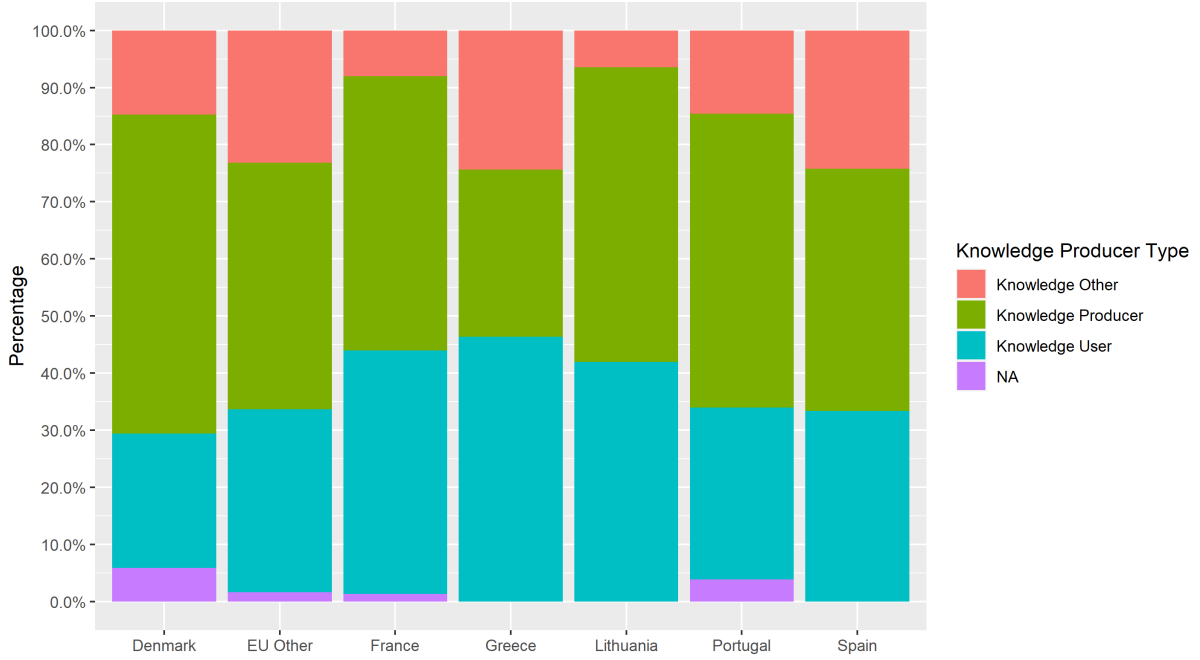
NB: Percentages of responses by type and country. NA, no response to the question about type of knowledge organisation. Countries are sorted in (English) alphabetical order. *Source*: Own elaboration.

([6]) Bulgaria, Czechia, Germany, Estonia, Ireland, Croatia, Italy, Cyprus, Latvia, Hungary, Austria, Poland, Slovenia, Slovakia, Finland, Sweden.

Concerning knowledge organisation type, 228 (45.8 %) respondents attributed themselves to different types of knowledge-producing organisations (universities, research institutions), 172 (34.5 %) to different types of knowledge-using organisations (public administrations at all levels of governance) and 88 (19.7 %) to other types of knowledge organisations (think tanks, academies of science, business organisations, non-governmental organisations and others) (Table 3). Finally, 10 (2 %) respondents did not answer the question.

The distributions of professional groups across countries were mostly comparable. As seen in Figure 2, Denmark had the largest share of knowledge producers, followed by Lithuania, Portugal and France, while Greece had the lowest share of knowledge producers but the largest shares of both knowledge users and other types of knowledge professionals.

Figure 2. Overview of respondents by country and professional type



NB: Countries are sorted in (English) alphabetical order. Sample size = 498. NA, no response to the question about the type of knowledge organisation. *Source*: Produced by the authors.

3.1.2. Lack of meeting opportunities and ecosystem fragmentation

First, we provide an overview of the issues identified by survey participants. Figure 3 presents the aggregate responses to the challenge statements by each of the four dimensions. Overall, there is large variation in responses to the questions for each of the four dimensions, except for the productive interactions dimension, where answers are more similar.

The percentages of respondents agreeing with individual statements were highest for statements about the lack of meeting opportunities and the fragmentation of the ecosystem as part of the institutions and resources dimension. Around 7 out of every 10 respondents (strongly) agreed with the statements about the lack of regular and well-supported opportunities to meet and exchange ideas between scientists and policymakers (71.3 %) and the S4P ecosystem being fragmented and suffering from limited coordination of actors and activities (70.1 %). This result corroborates existing research in terms of the relevance of both institutional and personal, informal contacts for scientific knowledge circulation and uptake from policymakers (Oliver and de Vocht, 2017; Haynes et al., 2018). In addition, the S4P ecosystems are also not considered easily accessible for newcomers (62.1 %).

It is worth noting that respondents answered the survey sometimes after having attended a workshop on the S4P ecosystems (see Chapter 2), which will most likely have had an influence on the responses. For example, at some workshops, draft discussion papers were shared indicating that, among other things, S4P ecosystem fragmentation is an issue (Maxim, 2022; Simões, 2022). Nonetheless, our results are consistent with previous research and systematic reviews emphasising how the absence of personal contact between scientists and policymakers is the main barrier to the use of research by policymakers (Choi et al., 2005; Oliver et al., 2014; Capano and Malandrino, 2022). Therefore, despite a potential impact of workshop attendance on some responses, existing research seems to support our findings about the lack of meeting opportunities and the fragmentation of S4P ecosystems as key challenges for implementing successful S4P practices. A further crucial issue on which more than half (51.4 %) of the respondents agree is the absence of dedicated organisational structures and processes for sharing scientific evidence with policymakers. While still considered a potential hindrance for establishing better science–policy interfaces, the lack of financial support for S4P is, in contrast, perceived as less central than other challenges in the institutions and resources dimension (with 47.2 % of respondents agreeing and 25.3 % disagreeing with the statement).

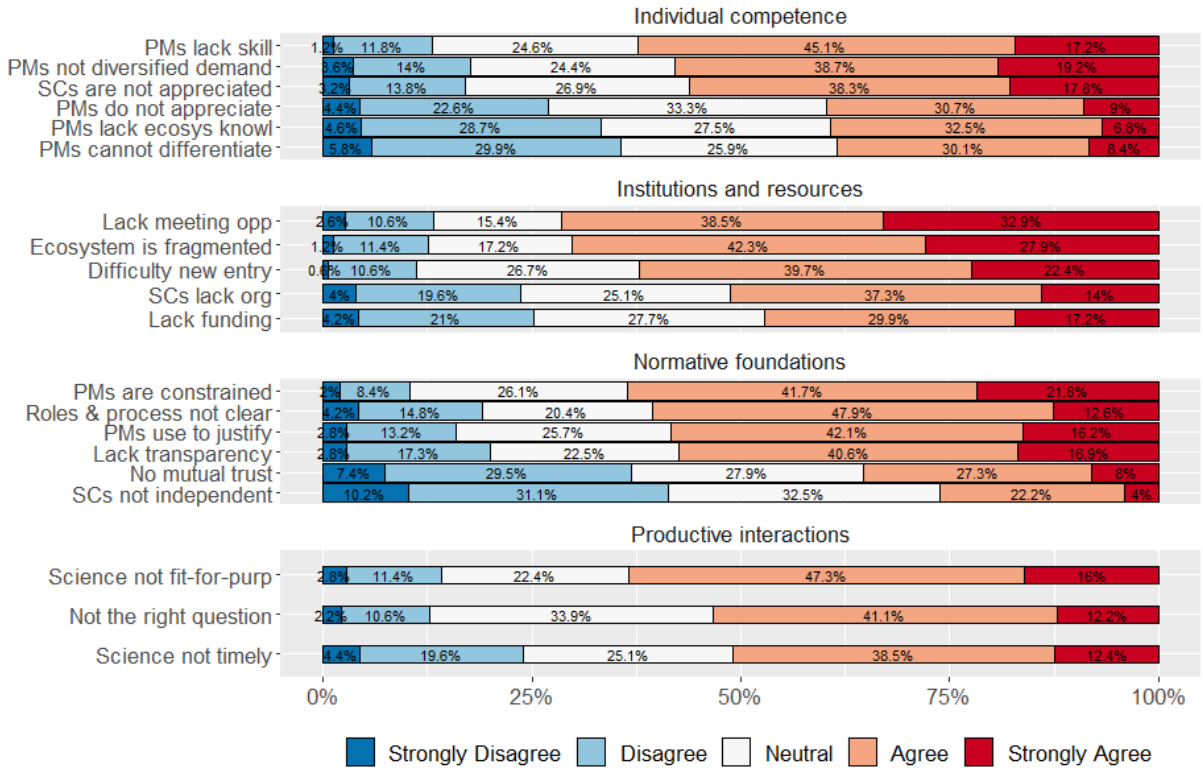
The lowest levels of agreement among respondents were with two statements often at the heart of discussions about the role of expertise in policymaking, namely that scientists engaging in S4P may jeopardise their independence (131/498, 26.3 %) and that there is no mutual trust between scientists and policymakers (176/498, 35.3 %). When it comes to providing policy advice, scientific independence has been established as a core principle (Gluckman, 2014; OECD, 2015; SAPEA, 2019). Respondents do not largely perceive it as a fundamental problem between scientists and policymakers in the current S4P ecosystem, possibly indicating that the set-up is perceived to be sufficient to ensure independence. Respondents seem to vary in their perspectives on whether there is a lack of mutual trust in the system, with few (no majority) either agreeing or disagreeing, and very few having extreme views on this issue. Issues related to these two statements are often at the heart of discussions about the role of expertise in policymaking (Christensen and Lægried, 2022; Gundersen and Holst, 2022). When it comes to policy advice, both the issue of the independence of scientists and the level of trust at the science–policy interface are considered crucial qualities for the functioning of S4P ecosystems and their democratic credentials (Schroeder, 2021). Hence, the fact that a non-negligible percentage of respondents acknowledged the limited independence of scientific experts and the lack of mutual trust between scientists and policymakers, along with the large number of respondents who had a neutral view on the statement, invites careful consideration of the results from policy and normative perspectives.

Statements on other normative foundational challenges receive stronger agreement, such as policymakers being constrained in their use of evidence (63.5 %) and using science to justify decisions *ex post* (58.5 %), and a lack of transparency (57.5 %), with a majority of respondents (strongly) agreeing with each. This shows that despite trust and independence are seen as given, the operational logic of policymaking still seems to interfere with the uptake of science, constraining policymakers' capacity to consider and use evidence. This perception of such a disconnect is also mirrored in respondents' answers concerning knowledge supply, as there is wide agreement on the lack of recognition, rewards and/or support for S4P in the science system, as mentioned above.

The lack of particular competences of individuals and organisations affects the production, provision and use of appropriate scientific knowledge for policy. The responses to the survey point to the shared perceptions that, on the one hand, policymakers often lack the skills to ask the right questions (with 53.2 % (strongly) agreeing with the relevant statement) and appraise scientific evidence (with 62.3 % (strongly) agreeing), and the evidence base they request is not sufficiently diverse (with 57.9 % (strongly) agreeing), while, on the other hand, science advice does not seem to be sufficiently recognised, especially among peers, employers and funders (with a majority (56.1 %) agreeing). There is no substantial agreement concerning policymakers' lack of knowledge of the ecosystem (39.3 % agree v 33.3 % disagree) or the ability to distinguish scientific knowledge from stakeholder opinions (38.3 % agree v 35.7 % disagree).

For the productive interactions dimension, the majority of respondents agreed that science is not fit for purpose and not timely and that policymakers do not ask the right questions for receiving useful science advice. Thus, while other statements garner stronger support than statements in this category, overall, the interactions between policymakers and scientists, when they happen, are not seen as productive enough.

Figure 3. Survey results across all respondents: levels of agreement with statements about what is needed for a better S4P ecosystem



NB: Sample size = 498. The short versions of the statements are shown in the figure; see Table 1 for full statements. Statements have been sorted from the highest rate of agreement (strongly agree and agree, top) to the lowest (strongly disagree and disagree, bottom), by S4P ecosystem dimension. SC, scientist; PM, policymaker. *Source*: Own elaboration.

When considering the results in terms of the four S4P dimensions identified, there is no dimension that dominates over the others in terms of respondents' agreement with the associated statements. Statements related to systemic issues in the institutions and resources and normative foundations dimensions received the strongest support, yet there are relevant variations in responses within each subset of statements, which suggests caution in inferring clear rankings among dimensions. Indeed, for 14 of the 20 statements, the percentage of respondents agreeing with each statement was greater than the percentage disagreeing, suggesting a shared perception among respondents of the need to strengthen the S4P ecosystem across all dimensions.

Overall, our findings are in line with several existing studies on relations at the science–policy interface. Respondents' agreement on the fragmentation of S4P ecosystems and the lack of formal and informal channels for personal exchange corroborates recent research on institutional arrangements to bridge science and policy (De Donà and Linke, 2023) and multilevel ecosystems of evidence-informed decision-making (Schünemann et al., 2022). Furthermore, responses to the survey show how individual capacities and lack of skills on both the knowledge supply and demand sides are perceived as crucial obstacles to providing effective science advice, although there seems to be a stronger agreement on the dimensions of competences and normative approaches of policymakers towards S4P compared to issues relating to the science side. On the need for improved competences, our results support recent calls to improve the capacity of intermediaries and knowledge brokers to facilitate interactions and translation efforts across the S4P ecosystem (Cairney et al., 2023).

3.1.3. Patterns in professionals' perceptions based on correlation analysis

Having considered the four dimensions of the S4P system separately, correlation analysis reveals interesting patterns among the responses (Figure 4). First, almost all significant correlations are positive and there are only

a few significant negative correlations of low magnitude ([7]). This result suggests that most the factors that could contribute to a better S4P system surveyed in this study are directly related according to the perceptions of professionals at the science–policy interface.

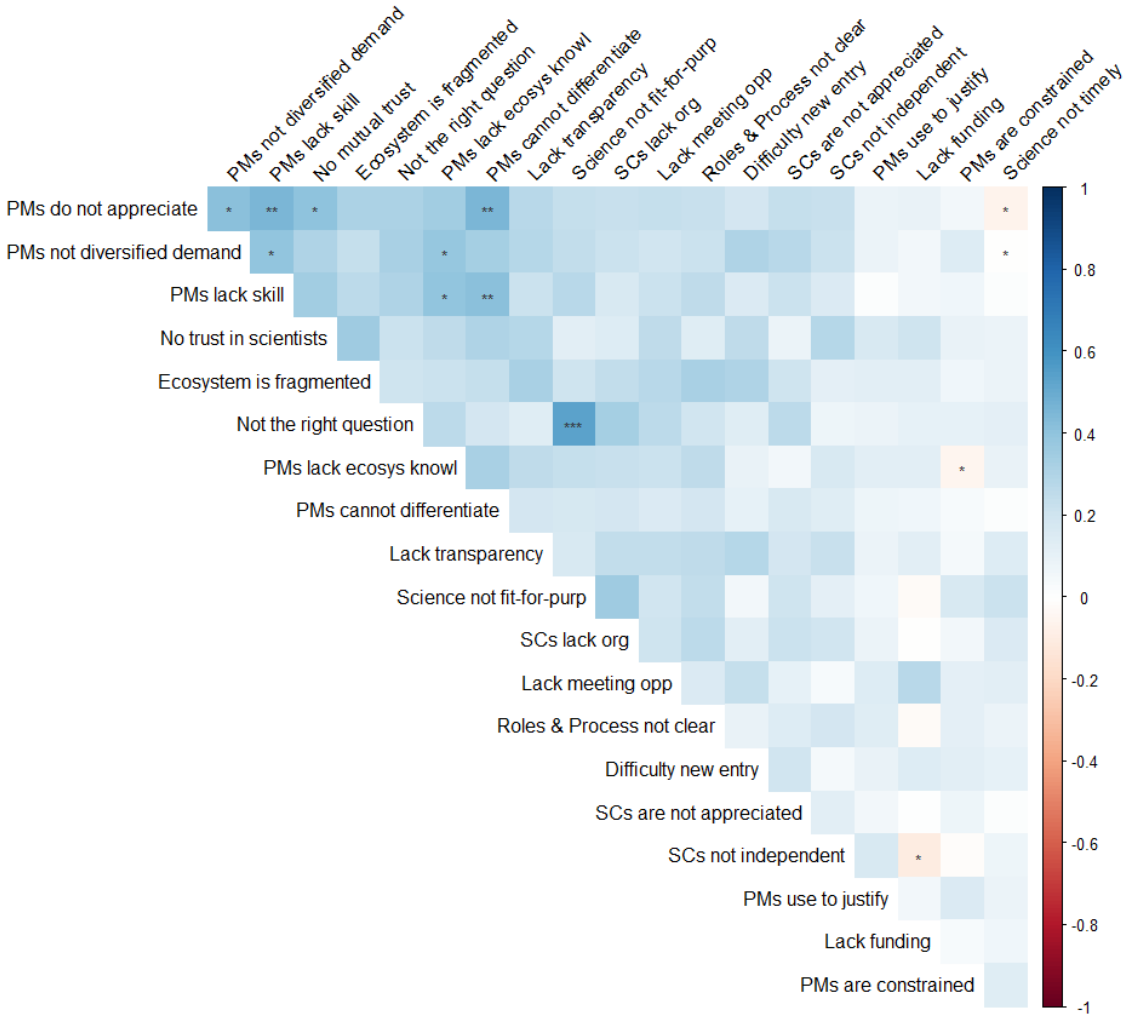
The strongest correlation can be found between the statements 'Scientists receive questions from policymakers and knowledge brokers framed in such a way that they can provide useful evidence-informed inputs' (rev) and 'Scientific knowledge is synthesised, translated and formatted in a way in the ecosystem that policymakers can use it easily' (rev) (corr = 0.54***). Hence, those respondents who agree that policymakers are not asking the right questions also tend to think that the scientific knowledge provided is not fit for purpose. Given that agreement on both these issues is not significantly correlated with any of the other statements, this result suggests that, while acknowledging translation between science and policy as a key challenge, respondents diverge in terms of their perceptions of which specific institutional, competence or normative foundation should be improved. Such observations emphasise the need to better understand the opportunities and constraints in relation to interacting at the science–policy interface and building competences to build a successful S4P ecosystem.

Furthermore, there are some significant correlations when it comes to S4P and policymaking competences. Respondents who agree with the statement ''Most policymakers appreciate the unique value of scientific knowledge for policymaking' also tended to also agree with the statements Policymakers have the skills to broadly understand and critically appraise scientific evidence and arguments (rev) (corr = 0.45**), Policymakers recognise the difference between scientific knowledge and stakeholder opinions and other forms of analyses (rev) (corr = 0.45**), Policymakers seek out broad and diverse scientific knowledge, not only a single expert/study, to inform their policy deliberations and design (rev) (corr = 0.42*) and Policymakers do not trust scientists (and vice versa) (corr = 0.41*). These questions seem to build a cluster of answers that go together, which suggests a certain degree of mistrust in the abilities and behaviours of policymakers towards scientists. This cluster also contains other minor correlations between the statement Policymakers know which scientific institutions and knowledge brokers in your country can provide evidence and analytical capacities to address their questions (rev) and the statements Policymakers have the skills to broadly understand and critically appraise scientific evidence and arguments (rev) (corr = 0.39*). Finally, there are a few negative correlations, but of very low magnitude, between statements concerning the existing constraints for S4P on the science and policymaking sides.

Overall, the correlation analysis reveals that the questions mostly cover the same ground in professionals' perceptions, with patterns pointing notably to moderate positive correlations in almost all areas, rather than sharp differences pointing to weaknesses on either the policymaker side or the scientist side. Although the perception of mistrust in policymakers' use of evidence and skills towards science uptake points to a cluster, there are no clusters of strong disagreement on the challenges for S4P ecosystems. Indeed, respondents agreeing on policymakers' lack of S4P competences also largely agree on the need for change in terms of scientific knowledge translation and synthesis. The statements on asking the right questions and the scientific translation, in this respect, seem to be an interesting indicator of the perceived need to address both sides of S4P ecosystems, through improving S4P competences and providing opportunities to better connect knowledge suppliers and users.

([7]) In discussing correlation patterns, significance levels are indicated, as per convention, with asterisks: * for a 10 % significance level, ** for a 5 % significance level and *** for a 1 % significance level.

Figure 4. Correlation patterns in S4P survey results



* 10 % significance level. ** 5 % significance level. *** 1 % significance level. NB: The short versions of the statements are shown in the figure; see Table 1 for full statements. Colours represent the strength of correlations, with shades of blue representing positive correlations and shades of red negative correlations. Sample size = 498. SC, scientist; PM, policymaker. *Source*: Own elaboration.

3.1.4. Multiple challenges across science for policy ecosystems: embracing a holistic perspective

The analysis of the responses across the entire sample set suggests that challenges for S4P ecosystems touch on all four dimensions, with varying levels of agreement within and across each dimension. The respondents' perceptions suggest recognition of room for improvement across all dimensions (i.e. the need for support/reforms in relation to system services, rules, resources and information; structures, mindsets, knowledge and processes that support engagement and productive interactions between different actors; and knowledge, skills and services that reduce costs of transmitting and absorbing knowledge into policymaking).

The statement with the highest level of agreement, about the challenge that scientists and policymakers lack regular and well-supported opportunities to meet and exchange ideas, belonged to the institutions and resources dimension (71.3 % agreement; Figure 3). This is a particularly relevant finding, as it corroborates existing research on the critical role of both formal and informal channels for science advice. Empirical studies tend to emphasise how policymakers often seek science advice via trusted interpersonal channels (Haynes et al., 2018), and informal and unplanned contacts, throughout the policy process, are facilitators for evidence uptake (Oliver and de Vocht, 2017), enabling or interfering with engagements and productive interactions between the scientific and policymaking communities. For instance, the culture and operational logic of these

distinct communities may prevent engagement, mutual appreciation and the use of institutional channels provided by intermediary, bridging or boundary organisations and processes.

Furthermore, the high level of agreement with many of the statements (agreement higher than 50 % for 14/20 statements) gives rise to important questions around (the need for) shifts in research and practice / capacity building in the field of S4P. These results open new research avenues and corroborate recent efforts to embrace a holistic view in the analysis of S4P ecosystem challenges, including those around the need for more systematic interactions between science and policy professionals, which does not seem to be hindered by a lack of trust, independence or funding, but rather by a lack of opportunities to meet and have productive exchanges. While there is research that emphasises a specific dimension of science advice, such as studies on the individual S4P competences of policymakers and scientists (OECD, 2015; Schwendinger et al., 2022) or on practices of boundary spanning, knowledge brokering and intermediary organisations' research (Pielke, 2007; Spruijt et al., 2014; Gluckman et al., 2021), the literature on S4P ecosystems is only now emerging (Boaz et al., 2019; Global Commission on Evidence to Address Societal Challenges, 2022; Oliver, 2022). Contributing to this emerging literature, this report calls for new systematic efforts to map and analyse S4P ecosystems from a holistic perspective, looking at interconnections between actors, factors and the different dimensions of the science–policy interface.

Global societal challenges have become very difficult and complex to address, with the need not only to leverage scientific expertise from across multiple disciplines, but also to promote political discussions at the international level to agree on policies that can be later implemented across governance levels. This multidisciplinary scientific advice and interinstitutional coordination seems particularly important. It is the cause for discussions at the highest international level, such as that of the United Nations (*Nature*, 2022). Moreover, the norms and rules that underpin S4P ecosystems shape interactions and incentives at the (inter)organisational and individual levels. They may influence 'who has the right to speak on expert matters; when and for which sorts of decisions evidence will be invoked; where budgets will be utilised to generate new evidence; and, ultimately, whose interests are represented and promoted from the operation of the evidence advisory system' (Parkhurst, 2017).

Working and improving this level of interaction quality in an S4P ecosystem in Europe may yield the largest gains for better policymaking. In other words, based on the perceptions of the professionals at the science–policy interface surveyed here, while the supply and demand side factors are seen as relevant, the clearing mechanisms between demand for scientific evidence and supply are perceived to be underdeveloped.

3.2. Variation in professional groups' perceptions of problems

The unique sample used for this survey allows us to test whether or not the perceptions of respondents on different sides of the S4P ecosystems differ significantly from each other. This is an interesting question, given that existing research acknowledges a common perceptual issue in that people usually find fault in the counterpart arguments. In addition, identifying any agreements between groups could potentially provide us with insights into joint problem perceptions (or the lack thereof).

As aforementioned, almost half (45.8 %) of respondents belonged to knowledge-producing organisations (universities, research institutions, etc.), 34.5 % belonged to knowledge-using organisations (public administrations at all levels of governance), 19.7 % belonged to other types of knowledge organisations (think tanks, academies of science, business organisations, non-governmental organisations, etc.) and 2.0 % did not select a category or type. We did not consider this latter group in the analysis of specific answers to statements between the three professional groups, and thus analysed a set of 488 respondents.

Testing for significant differences between the responses about challenges by both knowledge professional type and country, we performed a two-way multivariate analysis of variance (MANOVA) test, which delivered significant results (knowledge professional type, $p = 0.043$; country, $p = 0.000$). The interaction between type and country was not significant ($p = 0.502$). Thus, we performed a post hoc test for all combinations of countries and knowledge professional types, but not the interaction. Table 4 shows the combinations of tests, and the adjusted significance levels based on Bonferroni corrections. After adjusting significance, the difference between knowledge brokers and knowledge producers is not significant, but the differences between the others (i.e. between knowledge brokers and knowledge users and between knowledge users and knowledge producers) are highly significant. For information on countries, see Section 3.3.

Table 4. Pairwise *t*-tests for knowledge professional types

G1	G2	p-value		Bonferroni adj. p-value	
Knowledge broker	Knowledge producer	0.017	*	0.105	ns
Knowledge broker	Knowledge user	0.000	****	0.000	****
Knowledge producer	Knowledge user	0.000	****	0.000	****

* 10 % significance level. ** 5 % significance level. *** 1 % significance level. NB: Sample size = 488. *Source*: Own elaboration.

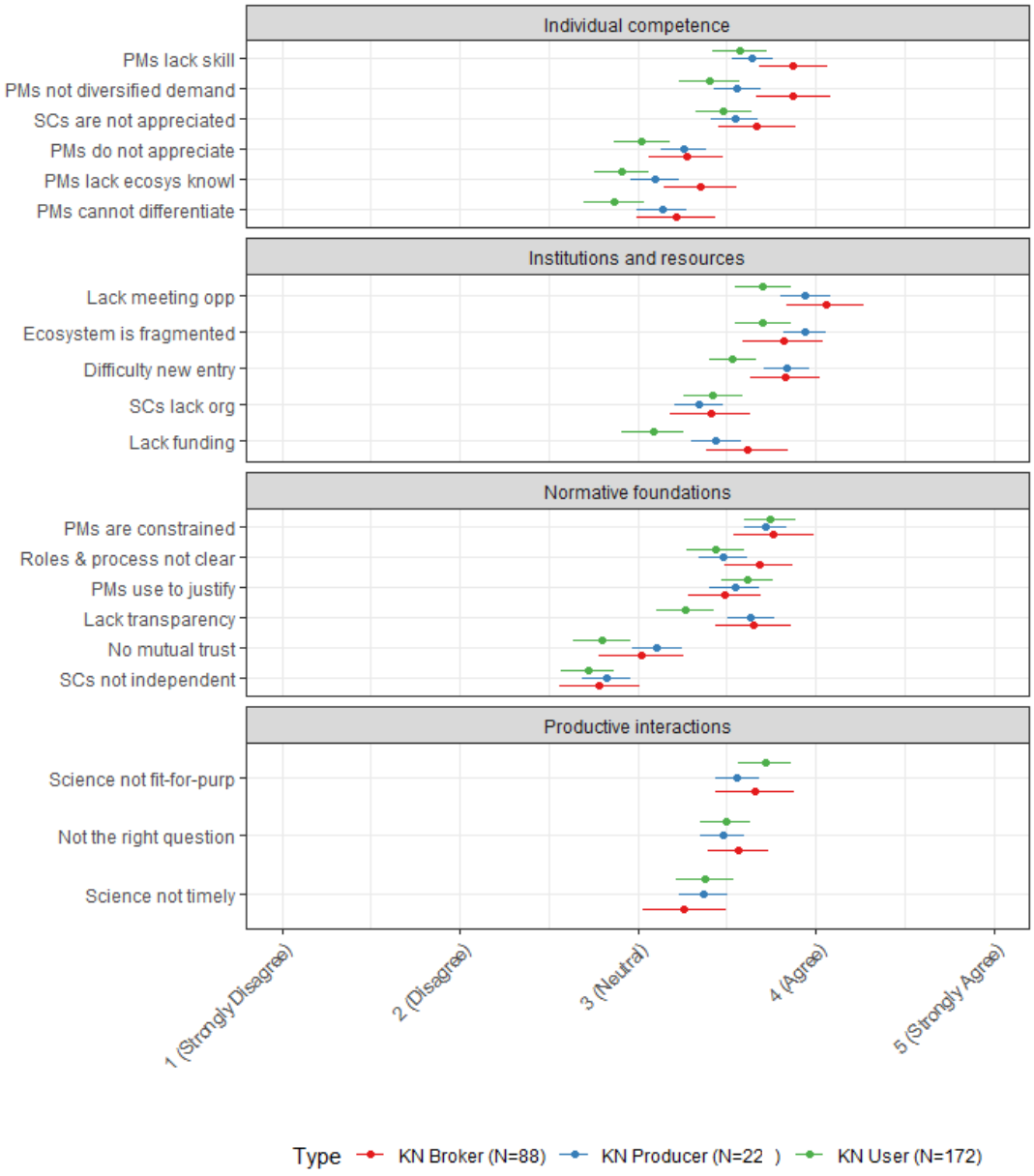
Following the finding of significant differences between knowledge professional types, Figure 5 plots means by question and by type. In order to not inflate the number of hypotheses tested in this explorative part, and given that not all overall type comparisons are significant at this stage, we refrain from further pairwise statistical testing. Nevertheless, the graphical analysis reveals a number of apparent patterns. On average, the different types of knowledge actors in the ecosystem seem to have relatively similar responses for most questions, and only a few variations can be seen, even when there is a general significant difference between brokers, users and producers of knowledge. In addition, no type agrees most or least about all challenges, showing that variation is likely to represent the various positions in the ecosystem, where each player gathers different experiences with the system. Nevertheless, some tendencies can be derived from the answers. It should also be noted that knowledge brokers, who function as a bridge between the producers and users of knowledge, are likely to be the most experienced in understanding both sides and therefore their perspectives are particularly relevant.

On individual competences, knowledge brokers agree the most in relation to all challenges, showing that they strongly perceive there to be a lack of competence on the policymaker side, which most statements in this dimension relate to. There are some differences, particularly between users and brokers, in responses to statements regarding policymakers' lack of skills, inability to differentiate different inputs, lack of diversified inputs and lack of ecosystem understanding. Only for the 'Scientists can expect recognition, rewards and/or support for science for policy/advice work by their employers, funders and peers' (rev) are all groups in agreement. Producers sit in between the two most 'extreme' views of the system and its challenges. Such a result calls for a more careful consideration of the two-communities idea, since, based on these individual competences dimension, the dividing line appears to run through users and intermediaries, rather than between producers and users.

For the institutions and resources dimension, the knowledge brokers group agrees with some statements less than the other groups do, although this group agrees significantly more with statements related to a lack of meeting opportunities, a lack of funding and difficulties faced by new ecosystem entries than the knowledge users group. In contrast, there is no significant difference between groups' responses to statements on ecosystem fragmentation and the lack of scientist organisations. For the normative foundations dimension, there are non-significant differences for most items, with the exception of a lack of mutual trust, where users and producers disagree the most, with knowledge producers having agreed the most that there is a lack of trust. Both producers and brokers agree significantly more strongly than users with the statement on the lack of transparency in knowledge use.

Overall, knowledge-broker respondents had the highest level of agreement among the three groups for 70 % (14/20) of the statements. This may indicate that organisations operating in the intermediary space have a more widely shared perception of the challenges that characterise the S4P ecosystem. As knowledge brokers interact with both scientific and policymaking communities more regularly, they are likely to. Be more aware of the gaps and needs at the science–policy interface. This is only one possible interpretation, and the opposite could be true, as the group 'travelling both worlds' could see issues as less problematic, having a better understanding of the logic of policymaking and of science production. If that were the case, a conclusion could be that a better understanding on both sides would reduce tensions and perceptions of a lack of performance in the S4P ecosystem. In contrast, given that knowledge brokers seem to have the highest level of agreement with most of the statements on challenges, this should give rise to warning signs about the S4P ecosystem overall.

Figure 5. Responses by professional type



NB: Sample size = 488. The short versions of the statements are shown in the figure; see Table 1 for full statements. Dots represent means and lines represent 95 % confidence intervals. KN, knowledge; PM, policymaker; SC, scientist. *Source*: Own elaboration.

In contrast, users of knowledge showed the lowest level of agreement for 70 % (14/20) of the statements. This result may be less of a surprise, as policymaking requires the inclusion of many different types of input, not just scientific, which may be of less concern for knowledge users than for knowledge brokers and producers. Nevertheless, the three statements that users had the highest level of agreement with were two that highlighted the shortcomings of producers (timeliness and fit for purpose) and one that described policymakers using the knowledge to justify their position *ex post*. The first two are in line with expectations, as receiving meaningful contributions in a timely fashion is often identified as a key issue for knowledge use by policymakers. The other highest score for users is instead prima facie surprising. In principle, we would have expected producers and brokers to have a stronger perception of policymakers' instrumental evidence use. Instead, knowledge users seem to be more concerned by the selective uptake of science than their counterparts. This result may be interpreted in light of the stronger awareness of knowledge users about practices of science use, due to their

close involvement in the policymaking and decision-making processes or because they are more often confronted with cherry-picked evidence that argues against their own decision.

Knowledge producers most often seem to be in the middle, between brokers and users, in terms of their agreement with statements related to the challenges surveyed in this study. In principle, given their greater distance from the practice of policymaking and the challenges they face in terms of policy impact, we could expect knowledge producers to be the most vocal group in advocating for change in the S4P ecosystem. However, our results may be interpreted in light of the fact that impact on policy still represents only one dimension – and often not a main one – of the work of knowledge producers, a circumstance that may explain why knowledge producers perceive these challenges as less pressing than knowledge brokers.

Overall, it is important to remark that the gap in terms of perceptions of problems between the classic two communities and knowledge brokers was less pronounced than expected. This was even the case for questions in which professionals from one community were asked about the qualities of the other, such as in the abovementioned case of selective use of scientific knowledge. However, knowledge brokers are typically the most critical about the functioning of the S4P ecosystem, with producers being in the middle and users agreeing less with statements about the challenges faced.

Knowledge brokers being the most concerned about the S4P ecosystem may give rise to questions as to the capacities of intermediary organisations to connect the two communities effectively and their need for support and better integration with the other two communities. However, with the 'other knowledge organisations' category being the least clearly defined organisational category in the survey design, this insight needs to be treated with caution. It also gives rise to the question of whether the perception of users was correct or had the most internal heterogeneity because of other factors (policy field, closeness to policymaking and decision-making, etc.), given that both producers and brokers were more concerned with these issues. Therefore, more research is required to answer these questions.

Of users and producers, it seems that the latter had more negative perceptions concerning the knowledge and attitude of policymakers towards scientific evidence, including about the independence of scientists in providing science advice. In general, however, the divergence between producers and users was rather modest. The difference between users and producers may point to a certain imbalance between supply and demand at the science–policy interface, that is, that producers may (be able/willing to) supply more scientific evidence for policymaking than policymakers ask for and/or can process. This gives rise to questions about the political will and/or capacity to support S4P and the desirability for scientists to play a greater role in policymaking, or, alternatively, scientists inflating the importance of scientific evidence in policymaking over alternative inputs. Studies on the governance of evidence-informed policymaking (Parkhurst, 2017; Strand, 2022) underscore how a better use of science is not just a matter of good evidence, but is closely related to managing and balancing technical biases, hence ensuring 'scientific fidelity' and so-called issue biases, avoiding an overreliance on science and the overlooking of social values and political representativeness. In this sense, it calls for the incorporation of principles of democratic representation in the S4P ecosystem (Krick et al., 2019).

In terms of identifying the main challenges, our findings address research on the demand side of the S4P interface, in terms of supporting the view that time constraints and 'appropriateness' of science advice are key to providing effective science advice, especially according to policymakers (Bielak et al., 2008; Masood et al., 2020). Furthermore, a crucial challenge is the lack of trust between scientists and policymakers, in relation to which we observed an important asymmetry in terms of the perceptions of producers and users. While existing research tends to focus on policymakers' trust in science advice and the conditions under which such advice is considered trustworthy (Schroeder, 2021; Gundersen and Holst, 2022), our results suggest a need to pay greater attention to the other side of the coin and gaps in perception, and how knowledge producers' and brokers' trust affects science advice.

As for knowledge use, our findings address the extensive literature on the political use(s) of evidence (Daviter, 2015; Capano and Malandrino, 2022). In this regard, the counterintuitive apparent self-criticism of users regarding the selective use of evidence opens further avenues for research on policymakers' perceptions of their use of science and evidence, which is often studied from the perspective of knowledge producers. This is also connected to the idea that policymakers are constrained in taking science on board, which was among the top five statements in terms of agreement for all three professional groups, with a narrow margin of difference. The agreement on political and practical constraints in science uptake across all the participants hints towards a general awareness of the complexities of science advice, in contrast with naive views of the role of science in policymaking.

3.3. Variation in perceptions of problems by country: a six-country comparison

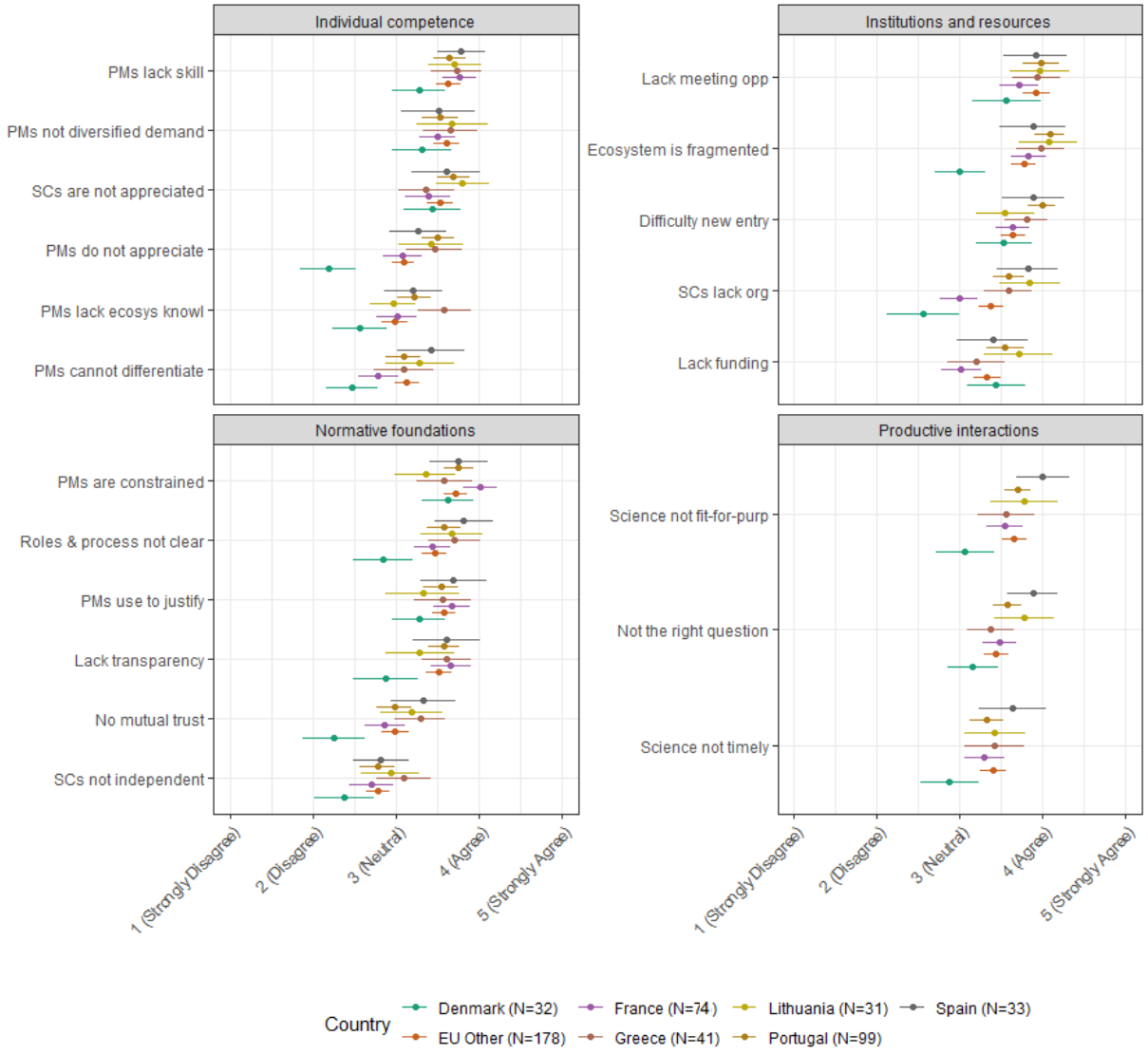
S4P ecosystems vary between countries (Figure 6). Some countries rely on chief scientific government advisors (e.g. Ireland, Cyprus), although this is relatively rare. National academies performing advisory functions or supporting the provision of science advice (e.g. in Germany and Sweden) are also not present in all countries. The literature on S4P ecosystems, from a comparative perspective, highlights how the science–policy interface reflects and evolves as part of historical, political and socioeconomic configurations and events within each country and in interactions with other countries / international organisations. Jasanoff (1990), in this regard, has highlighted the influence of different 'civic epistemologies' on the configurations of the science–policy interface, while Vogel (1986) discusses the role of expertise in national regulatory styles.

It is important to compare problem perceptions by country, first, to understand what institutional and political configurations might be conducive to S4P practices (i.e. statements with a lower level of agreement) and, second, to be able to design country-specific capacity-building work in a way that addresses the specific problem constellations.

Based on available responses, we included in our analyses the six countries for which we have received more than 30 responses each, as this number is often considered sufficiently large for analysing means (Kwak and Kim, 2017). These were Denmark, Greece, Spain, France, Lithuania and Portugal. We also included an 'EU other' category combining all other country responses from within the EU. The countries represent a diverse mix of geographical and institutional configurations, as well as a broad range of administrative and scientific capacities. The limited number of responses necessitates a word of caution, and country-specific statements are likely to be more uncertain than the type-specific results. Further research (boosting response, triangulation with other methods) could corroborate these initial findings.

Some steps in this regard are being undertaken under the umbrella of the JRC's S4P ecosystems project (e.g. discussion papers on national S4P ecosystems in Denmark (Budtz Pedersen and Hvistfeldt, 2021), Greece (Ladi et al., 2022), Spain (Cañibano and Real-Dato, 2024), France (Maxim, 2022) Lithuania (Vilpišauskas, 2021) and Portugal (Simões, 2022)). However, further analytical work, including specifically from a cross-country comparative perspective, is needed.

Figure 6. Responses by country



NB: Sample size = 488. Dots represent means and lines represent 95 % confidence intervals. PM, policymaker; SC, scientist. *Source:* Own elaboration.

Table 5 presents the results of pairwise tests of differences in response patterns between countries, with significance levels adjusted by Bonferroni correction (including the type tests in Table 4). There are various differences between countries, but not all are significant. Denmark is the only country that is significantly different from all other countries and the combined 'EU other' category.

Table 5. Pairwise *t*-tests for countries

Country 1	Country 2	p-value		Bonferroni adj. p-value	
Denmark	EU other	0.000	****	0.000	****
Denmark	France	0.000	****	0.000	****
Denmark	Greece	0.000	****	0.000	****
Denmark	Lithuania	0.000	****	0.000	****

Denmark	Portugal	0.000	****	0.000	****
Denmark	Spain	0.000	****	0.000	****
EU other	Portugal	0.000	***	0.005	**
EU other	Greece	0.010	*	0.219	ns
EU other	France	0.132	ns	1.000	ns
EU other	Lithuania	0.014	*	0.300	ns
EU other	Spain	0.000	****	0.001	***
France	Portugal	0.000	****	0.000	***
France	Lithuania	0.001	**	0.029	*
France	Greece	0.001	***	0.017	*
France	Spain	0.000	****	0.000	****
Greece	Spain	0.134	ns	1.000	ns
Greece	Lithuania	0.889	ns	1.000	ns
Greece	Portugal	0.958	ns	1.000	ns
Lithuania	Portugal	0.909	ns	1.000	ns
Lithuania	Spain	0.204	ns	1.000	ns
Portugal	Spain	0.088	ns	1.000	ns

NB: Sample size = 488. ns, non-significant. *Source*: Produced by the authors.

Despite the fact that Member States have different degrees of institutionalisation of science advice mechanisms and diverse ecosystem arrangements, responses to the survey show very similar patterns in responses across the six countries. The only clear exception seems to be Denmark (n = 32), which stands out across almost all the dimensions considered. Comparing the average level of agreement over the whole sample of questions (with lower scores meaning that there is less agreement among respondents that an issue is a challenge), Denmark's average stands at 37 %, while the remaining countries score between 51 % and 59 %. These results indicate that respondents in Denmark considered the issues covered by the survey less of a problem than respondents in the remaining five countries and the 'EU other' category.

The contrast is especially stark for statements such as 'policymakers do not appreciate advice', 'roles and processes are not clear', 'there is no mutual trust', 'the ecosystem is fragmented' and 'scientists lack organisation', along with a few other categories, showing the stronger perception that Denmark's S4P ecosystem seems to work rather well. The overall lower levels of agreement about challenges at the science–policy interface are consistent with recent research on the Danish S4P ecosystem (see Budtz Pedersen and Hvidfeldt, 2021). Still, respondents in Denmark agree that it is difficult for scientists to engage with policymakers (in our survey, the lack of meeting opportunities was the statement with the highest level of agreement, with 62 % of the Danish respondents agreeing or strongly agreeing with it). The other two top-ranked statements (with the highest percentage of 'agree' or 'strongly agree' responses) were those concerning policymakers' constraints in evidence uptake (56 %) and barriers to accessing the ecosystem (53 %).

A few additional observations stand out. For instance, Greek respondents were more concerned than respondents from other countries about policymakers' lack of ecosystem knowledge (63 %), with levels of agreement with this statement being far higher in Greece than in other countries surveyed (17 percentage points higher than the country with the next highest level of agreement). This response landscape suggests that respondents specifically in Greece perceive a need to improve the receptiveness of public administration and a need for a better overview and mapping of the S4P system, in line with existing research on the Greek S4P ecosystem (Ladi et al., 2022).

France, in line with the 'EU other' category, shows the lowest agreement with statements about the lack of organisational structures and processes for sharing scientific evidence. Unlike policymakers in Spain, which is at the upper end of the scale when it comes to productive relations, French policymakers are seen as most constrained. Among the countries considered, France seems to show a stronger focus on the limits and challenges on the knowledge users' side than on the scientist organisation side. For instance, respondents in France largely agree on the presence of constraints in the use of science for policymakers (77 %, with the next country 13 percentage points lower). Furthermore, a key concern in France was the issue of autonomy of science

vis-à-vis political power, which recent research acknowledges to be a crucial element in the national S4P ecosystem (Maxim et al., 2022). In contrast, French respondents (and respondents from other Member States) agreed less with the statement about scientists lacking organisation.

In order to situate our results somewhat in the wider context, we compare the responses to the survey with a selection of measures of Member States' administrative and scientific capacities from multiple sources (see Table 6). Due to the limited nature of each of the measures, and a general lack of better alternatives for a science for policy performance directly (Niestroy 2022), conclusions based on these findings need to be interpreted with caution.

For instance, the gap that we observed in the survey results between Denmark and other Member States is also reflected in their comparative performance on measures of administrative and scientific capacities, such as strategic planning, governance, expert advice or publication and knowledge production measures. In all these areas, Denmark ranks first among our selection of countries. In a system that seems particularly well designed for the uptake of scientific knowledge in policymaking, concerns of S4P professionals are markedly different and their concerns about challenges for the S4P ecosystem are fewer than elsewhere. Nevertheless, there are some issues on which more than half of the respondents agree, in particular the lack of meeting opportunities, which was a shared concern across countries.

France's performance in administrative capacities and scientific capacities is mixed. While in multiple cases it ranks second (*ex post* policy evaluation, high educated population shares and high R & D expenditures), it is in last place when it comes to effective and legitimate consultation with non-governmental experts. This latter point seems consistent with French respondents' concerns, which also deviate from the average of other countries in our survey, about policymakers' constraints in terms of making use of science in policy decisions and about the lack of transparency and skills on the policymaker side. These results corroborate the observed perception in France that the S4P ecosystem faces more pressing challenges on the demand side than on the supply side.

With the exception of these two notable observations, it seems surprising that, despite relatively consistent differences in ranking between countries, respondents see the problems and challenges in their country in similar ways. While this substantial alignment of views across countries can be considered a relevant result in itself, the comparison with administrative and science capacity data also gives rise to a crucial question about the parameters of respondents' assessments. Indeed, the fact that S4P professionals across Member States agree on most of the challenges facing their countries' S4P ecosystems could possibly be due to their lack of clear benchmarks for international comparison. Having such benchmarks would allow them to consider their experiences in a wider context. However, the results could also suggest that, despite S4P performances that vary among the counties investigated, the fundamental issues for an effective ecosystem are the same everywhere and not sufficiently addressed with current solutions.

Table 6. Ranking of Member States by administrative and scientific international comparisons

Administrative capacity measures ([a])	**EU average**	**Denmark**	**Greece**	**France**	**Lithuania**	**Portugal**	**Spain**
Strategic planning capacity (Bertelsmann Stiftung – 2016)	NA	1	6	4	2	4	4
Societal consultation (Bertelsmann – 2016)	NA	1	6	3	2	5	3
Government performance indicator (composite Eupack)	NA	First quintile	Fifth quintile	Third quintile	Fourth quintile	Third quintile	Fourth quintile
Non-government expert advice (Bertelsmann SGI)	NA	1	2	5	4	5	2
Regulatory impact assessments (primary laws – transparency, oversight, etc., OECD)	NA	4	5	2	1	6	3
Ex post policy evaluation (OECD)	NA	1	6	2	3	4	5
Interministerial coordination (Bertelsmann – SGI)	NA	1	6	3	4	5	2
QoG impartiality of PA	NA	1	6	2	3	5	4
Scientific capacity measures (source: EU innovation scoreboard) ([b])	**EU average**	**Denmark**	**Greece**	**France**	**Lithuania**	**Portugal**	**Spain**
New STEM doctorates per 1 000 inhabitants	3	2	6	4	7	5	1
Percentage population having tertiary education aged 25–34 years	6	4	5	2	1	7	3
Percentage population aged 25–64 years participating in lifelong learning	3	1	6	2	5	4	3
International scientific co-publications per million population	3	1	6	5	7	2	4
Scientific publications among the top 10 % most cited publications worldwide as percentage of total scientific publications of the country	2	1	4	5	7	3	6
R & D expenditure in the public sector (percentage of GDP)	3	1	5	2	7	4	6
Employment in knowledge-intensive activities (percentage of total employment)	3	1	5	2	7	6	4

([a]) https://ec.europa.eu/social/main.jsp?pubId=8072&langId=en&catId=738&furtherPubs=yes&.
([b]) https://ec.europa.eu/docsroom/documents/45971.
NB: Eupack, European public administration country knowledge; GDP, gross domestic product; QoG, quality of government; NA, not available; PA. Public Administration; SGI, Sustainable Governance Indicator; STEM, science, technology, engineering and mathematics.
Source: Own elaboration based on information from the Eupack project and EU innovation scoreboard.

4. Conclusions and outlook

An important challenge for emerging S4P ecosystems is ensuring that 'decision-makers have access to the best available science when they need it, in a format they can use, and which is trusted by citizens' (European Commission, 2022b). In this report, we explored how these challenges are perceived by those who are at the forefront of evidence-informed policymaking, whether on the side of knowledge supply or demand, or bridging the gap between the two.

We can draw several lessons from this exploratory analysis of the qualities of S4P ecosystems in Europe. Overall, S4P professionals across the countries surveyed agree on the importance of institutional issues, which seem to matter the most. While the small sample size of the survey does not allow for strong inference on broader patterns at the EU level, this result calls for further analysis of and attention to be paid to the contextual conditions that enable effective exchanges at the science–policy interface. It seems not to be the lack of funding or resources that hinders effective S4P in the EU, but rather putting people in contact with each other and bridging the divide between the two communities.

Closely behind the high level of agreement with statements about ecosystem fragmentation and the lack of meeting opportunities comes agreement with the facts that policymakers are constrained in what they can take on board and have limited competences and skills in S4P, and that science is often not 'fit for purpose'. This indicates that work on the ability of scientists or knowledge brokers to translate science as well as on their absorptive capacity and skills is necessary.

Despite some challenges being perceived as more pressing, however, the high levels of agreement observed for most of the items in the survey suggest wide consensus on the need for change in S4P ecosystems, with respondents' choice for 'agree' or 'strongly agree' being, on average, 53 % over the 20 statements. This result, thus, can be interpreted as a call for change when echoed by all sides and across countries. In particular, our findings point towards a rather surprising alignment of views across Member States, with no stark differences between respondents across the EU (except perhaps Denmark). This result, however, should be considered with caution due to the unbalanced distribution of respondents across Member States, with an over-representation of respondents from some countries. Nonetheless, in terms of the four dimensions described, we did not identify any clear hierarchy in terms of needs. Within each dimension, there were varying levels of agreement. What emerges from this exploratory analysis is that change is needed across most of the dimensions, while some individual factors may matter less, as mentioned above. Overall, the survey offers an initial mapping of the main areas of intervention for further developing S4P ecosystems and lays the foundation for future research across the four dimensions.

Considering the professional affiliations of the respondents, there are role-specific views on some of the problems, but there is also no stark difference. Knowledge brokers are the most critical in terms of agreement on the challenges that S4P ecosystems face. As experts on the matter, for whom S4P is a day-to-day job, this should be seen as a warning. More work on these intermediaries' perspective is thus needed. Existing literature on the relationship between science and policy has long relied on the idea of two communities that use different operational logic, values and languages (Caplan, 1979; Pal, 1990). Our results, with knowledge brokers and users being often at the extremes in terms of levels of agreement with the statements and with knowledge producers being in a middle position, suggest, however, that these two communities may be less divergent than often theorised, at least when it comes to problem perception.

In this regard, the JRC has been leading the way in trying to bridge the two communities and break down the science–policy binary separation, thus opening new avenues for research in terms of knowledge co-creation, policy impact and citizen engagement (Šucha and Sienkiewicz, 2020). In Europe, as elsewhere, science is increasingly under 'justification pressure' to prove its societal value, while policy is faced with complex challenges that can only be tackled with scientific knowledge, while also integrating considerations and analyses that are inclusive of experiential evidence. This, it seems to emerge from our survey, is the area towards which future research could be geared, to understand how to build and consolidate S4P ecosystems not only that bridge science and policy, but where the science–policy interface is co-produced (Maas et al., 2022).

Other than no strong role-specific differences, we did not find any significant oppositional patterns in the responses that could have shown a strongly different perception between scientists and policymakers. The highest correlation was observed between responses to the statements about policymakers not asking the right

questions and science not being fit for purpose, suggesting that these two challenges go hand in hand from S4P professionals' perspective.

In terms of respondents' agreement on specific issues, a somewhat surprising result concerned the self-critical perspective of knowledge users on policymakers' constraints in taking science on board. While it is possible to interpret this result as a critique directed towards other knowledge users' practices, rather than a self-critical stance, it is nonetheless a relevant finding. It suggests that policymakers, and knowledge users in general, are aware of these constraints – even more so than other actors in S4P ecosystems – and indicates a possible avenue for research and interventions that take into due account the political dimension of S4P and evidence-informed policymaking, in line with recent work conducted by the JRC (Raykovska et al., 2019).

Finally, despite the limitations mentioned elsewhere, our comparative country-level results offer some meaningful considerations for further research. Indeed, country-wise, we found surprising homogeneity in the responses. While Denmark stands out as the sole exception, with lower levels of agreement with most statements, across the other countries we observed substantial alignment in terms of challenge perceptions. This might be interpreted as a sign that, even though national contexts have a key role in influencing the specific qualities of Member States' S4P ecosystems, most of the challenges – and perceptions of them – are likely to be shared across countries. Hence, these results call for further research from a comparative perspective across Member States, and encourage transnational and EU-wide actions to be taken to tackle the challenges discussed in this report, as there might well be a somewhat common solution to shared problems.

An important caveat to all the results is that the evidence is based on a convenience sample, self-selected by interest to engage with the EU on questions around S4P, and is therefore not representative of all scientists, policymakers and knowledge brokers. In addition, the sample is small, especially for the country-specific analysis and comparisons. Such a limitation, which is due to the specific circumstances of the survey administration – which was conceived in the context of a broader initiative on S4P ecosystems – does not allow for generalisation at the European level. However, these preliminary results make clear the value of and need for additional evidence and further research to explore the perceptions of S4P professionals on a larger scale.

The JRC will follow up on this research with further analyses at the country level, examining the country-specific S4P ecosystems with a dedicated technical support instrument funded by the European Commission ([8]).

([8]) https://knowledge4policy.ec.europa.eu/evidence-informed-policy-making/topic/reforms-science-policy-7-member-states_en.

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List of abbreviations

ERA	European Research Area
JRC	Joint Research Centre
OECD	Organisation for Economic Co-operation and Development
R & D	research and development
R & I	research and innovation
S4P	science for policy
SWD	Staff Working Document

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Annexes

Annex 1. Questionnaire

Survey: Science for policy / science advice ecosystems in Europe – qualities

Qualities of science for policy / science advice ecosystems in Europe

The European Commission's Joint Research Centre is currently organising the project 'Strengthening and connecting eco-systems of science for policy across Europe'.

The **objectives of the project** are to:

1) better understand science for policy / science advice ecosystems across Europe;
2) build a community of professionals who are involved in these ecosystems in the EU-27 and beyond;
3) facilitate capacity-building projects that strengthen the institutional capacity for evidence-informed policymaking in Europe.

To achieve these objectives, the JRC organises **interactive online workshops** and runs **surveys** with/for professionals working at the science–policy interface.

We would like to kindly ask you to complete the below survey containing 20 short statements about the qualities of the science for policy ecosystem you are most familiar with to agree or disagree with.

Results from workshop discussions and surveys are regularly shared with those interested. The data are completely anonymised and will be used to inform debates in the workshops and JRC reports on science for policy and science advice institutions and processes.

We would like to **thank you very much** in advance for kindly contributing to this project by completing our survey.

In the case of questions, please do not hesitate to contact JRC-E4P-ECOSYSTEM@ec.europa.eu.

A. About you

Question 1.1. What is your nationality? (This is used to identify which country your responses apply to. If different, indicate under question 1.2.) (Selection Member States.)

Question. If you responded non-EU, please provide your nationality here:

Question 1.2. If different from the country whose nationality you hold, which science for policy / science advice ecosystem do your responses apply to? (Country; sector; international.)

Question 2. In which professional sector are you working?

Question. If other, please specify.

Question 3. What is your job title?

Question 4. Have you participated in one or more of the JRC 'Science for Policy Eco-systems' workshops? Yes/no.

B. About the qualities of science for policy / science advice ecosystems

To what extent do you agree with the following statements about the qualities of the science for policy / science advice ecosystem?

5 = Strongly agree
4 = Somewhat agree
3 = Neither agree nor disagree
2 = Somewhat disagree
1 = Strongly disagree.

Answers should relate to the situation in your country (or the system you are most familiar with, as indicated in 1.2 above).

NB:
Science for policy / science advice ecosystems refer to those institutions and processes that are involved in producing, synthesising, translating, integrating and using scientific knowledge in policymaking.

Policymakers include civil servants and elected politicians in governments and parliaments.

Knowledge brokerage are processes and institutions that help connect the distinct systems of policymaking and science by facilitating information exchanges and collaboration (e.g. via knowledge synthesis, moderating co-creation processes, organising interdisciplinary cooperation).

System view (six statements)

Question 1. The science for policy / science advice ecosystem is fragmented: in general organisations rarely coordinate their activities and are often not aware of each other's activities.

Question 2. Roles and processes within the science for policy / science advice ecosystem are clearly formalised (clear mandates, institutionalised mechanism, etc.).

Question 3. Policymakers do not trust scientists (and vice versa).

Question 4. It is very difficult for newly interested organisations and individuals to join science for policy / science advice processes and existing structures.

Question 5. Processes of production and use of scientific knowledge are **not** transparent to the public in the science for policy / advice ecosystem.

Question 6. Lack of funding for science for policy / science advice structures and activities is the main obstacle to evidence-informed policymaking.

The user side: policymaking (seven statements)

Question 1. Policymakers recognise the difference between scientific knowledge and stakeholder opinions and other forms of analyses.

Question 2. Policymakers tend to use scientific knowledge to justify (*ex post*) their decisions rather than inform them (*ex ante*).

Question 3. Policymakers have the skills to broadly understand and critically appraise scientific evidence and arguments.

Question 4. Policymakers know which scientific institutions and knowledge brokers in your country can provide evidence and analytical capacities to address their questions.

Question 5. Policymakers seek out broad and diverse scientific knowledge, not only a single expert/study, to inform their policy deliberations and design.

Question 6. Policymakers are strongly constrained in their ability to take science knowledge on board and often need to prioritise other considerations (balancing regional interests, etc.) instead.

Question 7. Most policymakers appreciate the unique value of scientific knowledge for policymaking.

The knowledge supply side (four statements)

Question 1. Scientists can expect recognition, rewards and/or support for science for policy / advice work by their employers, funders, and peers.

Question 2. Scientific knowledge is often not available at the right moment in time to be useful for policymakers.

Question 3. When participating in policymaking, scientific experts remain independent from the influences of policymakers.

Question 4. Scientific organisations have set up dedicated organisational structures and processes to share scientific evidence with policymakers.

At the science–policy interface: knowledge brokerage (three statements)

Question 1. Scientists and policymakers lack regular and well-supported opportunities to meet and exchange ideas.

Question 2. Scientific knowledge is synthesised, translated and formatted in a way in the ecosystem that policymakers can use it easily.

Question 3. Scientists receive questions from policymakers and knowledge brokers framed in such a way that they can provide useful evidence-informed inputs.

Space for additional comments (one statement)

Question 1. Please feel free to any comments as regards to **strengths and weaknesses of the ecosystem** you have commented on that were not covered by the previous statements.

C. Next steps

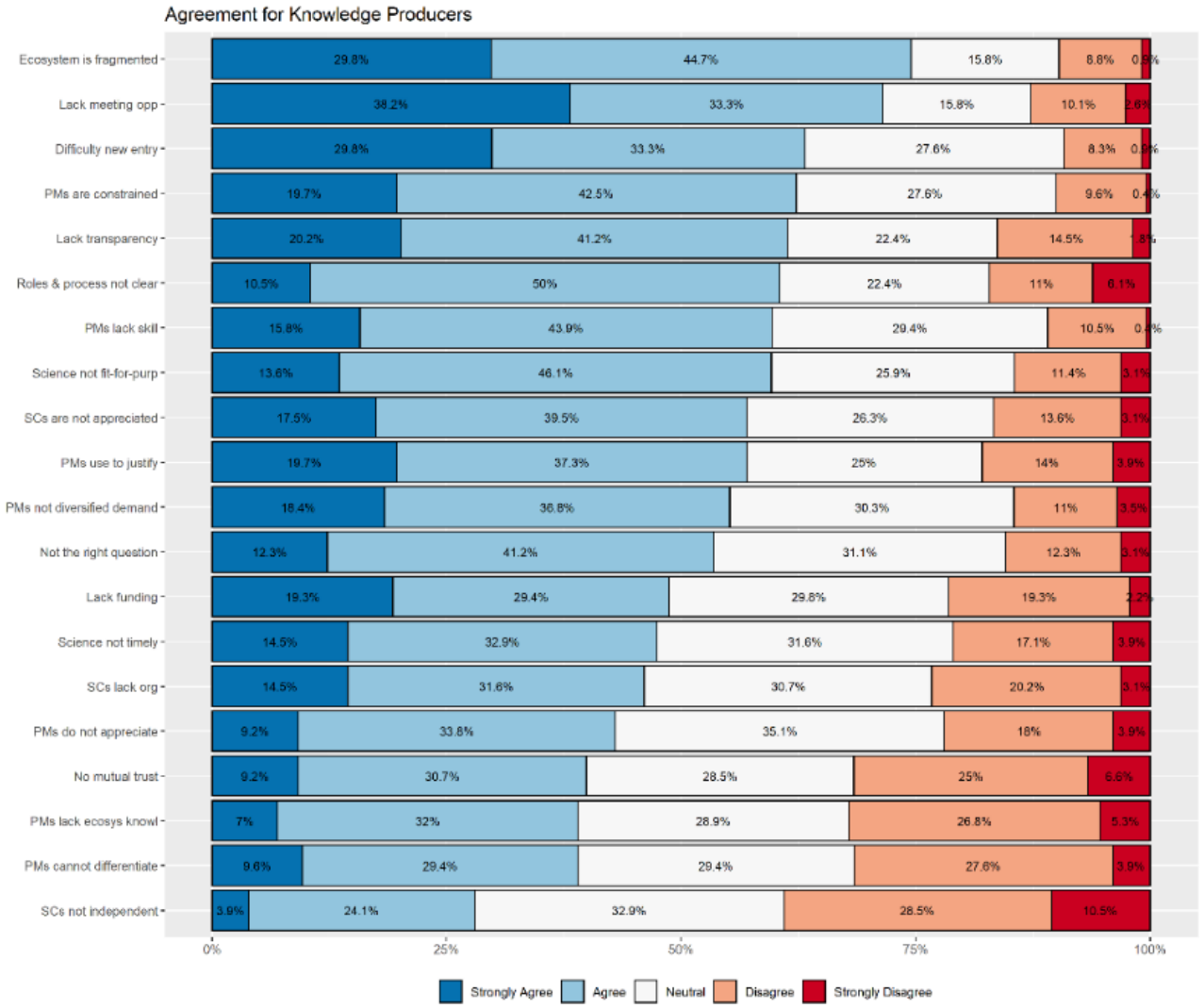
If you are interested in regular updates on the results, as well as workshops planned in the JRC online workshop series, please drop us an email JRC-E4P-ECOSYSTEM@ec.europa.eu or register for the project here.

Registration is only necessary if you have **not** registered for the workshop series before.

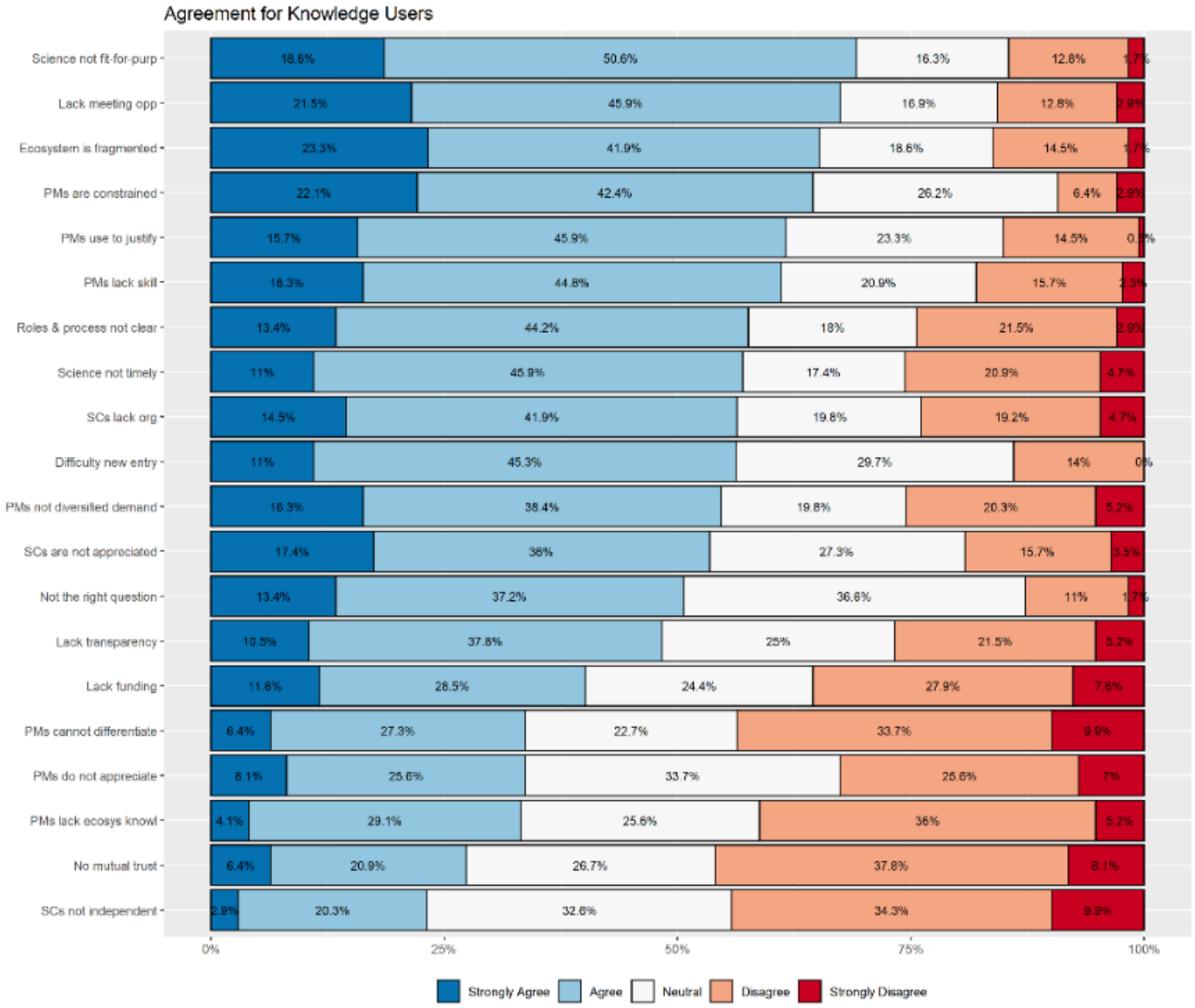
Annex 2. Further analyses

Figure A1. Specific answers by professional groups: knowledge producers (A), knowledge users (B) and other types of knowledge group (C)

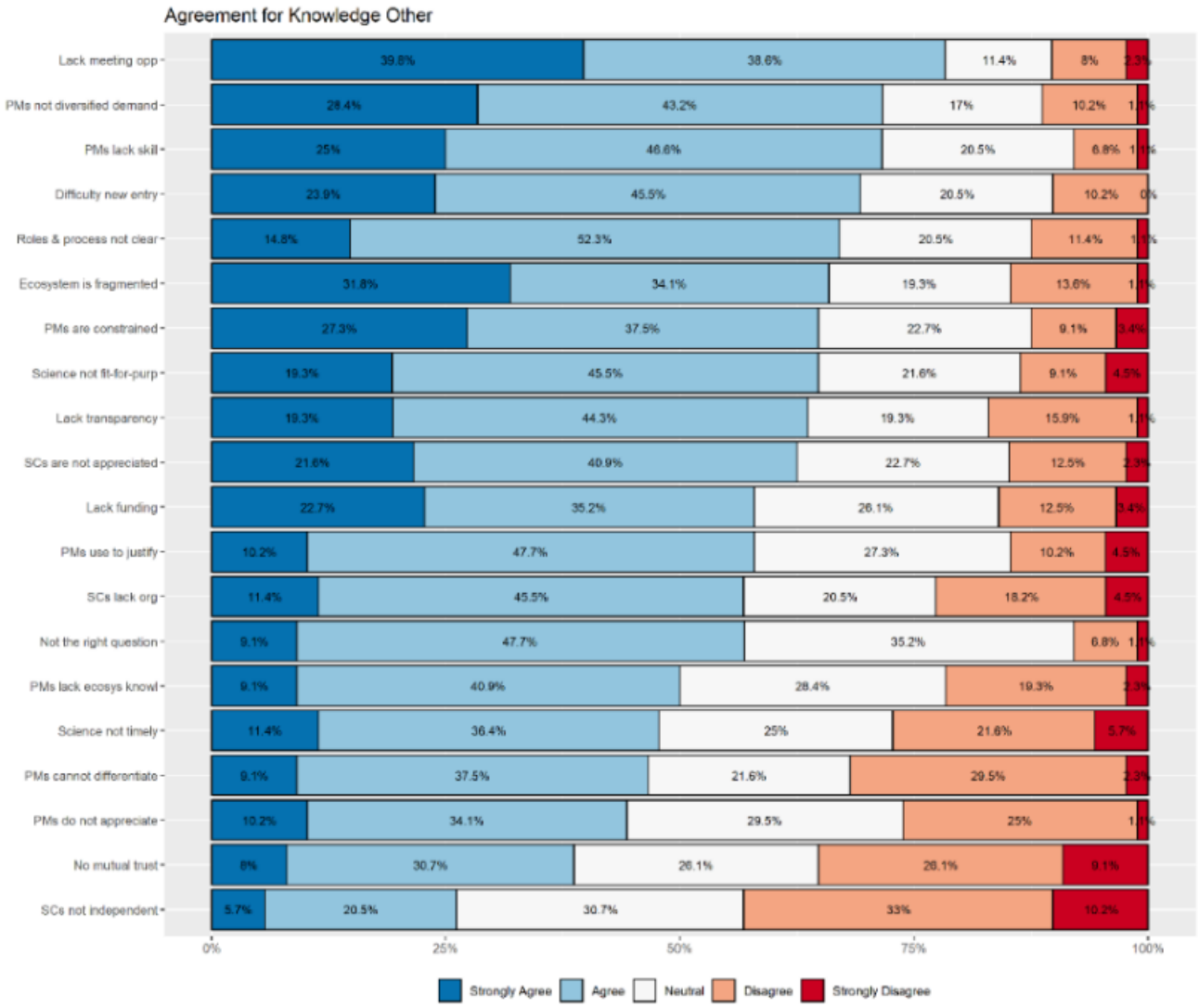
A



B


Agreement for Knowledge Users
Science not fit-for-purp
Lack meeting opp
Ecosystem is fragmented
PMs are constrained
PMs use to justify
PMs lack skill
Roles & process not clear
Science not timely
SCs lack org
Difficulty new entry
PMs not diversified demand
SCs are not appreciated
Not the right question
Lack transparency
Lack funding
PMs cannot differentiate
PMs do not appreciate
PMs lack ecosys knowl
No mutual trust
SCs not independent
18.6% 50.6% 16.3% 12.8%
21.5% 45.9% 16.9% 12.8% 2.9%
23.3% 41.9% 18.6% 14.5%
22.1% 42.4% 26.2% 6.4% 2.9%
15.7% 45.9% 23.3% 14.5%
18.3% 44.8% 20.9% 15.7%
13.4% 44.2% 18% 21.5% 2.9%
11% 45.9% 17.4% 20.9% 4.7%
14.5% 41.9% 19.8% 19.2% 4.7%
11% 45.3% 29.7% 14%
16.3% 38.4% 19.8% 20.3% 5.2%
17.4% 36% 27.3% 15.7% 3.5%
13.4% 37.2% 36.6% 11%
10.5% 37.8% 25% 21.5% 5.2%
11.6% 28.5% 24.4% 27.9% 7.6%
6.4% 27.3% 22.7% 33.7% 9.9%
8.1% 25.6% 33.7% 25.6% 7%
4.1% 29.1% 25.6% 36% 5.2%
6.4% 20.9% 26.7% 37.8% 8.1%
2.9% 20.3% 32.6% 34.3% 9.9%
0% 25% 50% 75% 100%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

C



NB: Sample size = 488, adjusted for only those respondents assigned to each of these three professional groups. The short versions of the statements are shown in the figure panels; see Table 1 for full statements. PM, policymaker; SC, scientist. *Source:* Own elaboration.

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