bioagora

Bio Knowledge Agora: Developing the Science Service for European Research and Biodiversity Policymaking

Governance Principles for a Future Science Service

D4.1. Report on the governing principles of a Science Service

Date of delivery - 30/06/2025

Eszter Kelemen (ESSRG), Zsófia Kollányi (ESSRG), Kata Fodor (ESSRG), Kármen Czett (ESSRG), Juliette Young (INRAE), Karla Locher-Krause (UFZ), Ben Delbaere (DC), Robin Dianoux (INRAE), Kinga Krauze (ERCE PAN), Alexandra Korcheva (Pensoft), Kaisa Korhonen-Kurki (SYKE), Roxanne Leberger (CREAF), Harineeswari Meenakshi Sundaram (UFZ), Marie Vandewalle (UFZ), Kati Vierikko (SYKE), Renata Włodarczyk-Marciniak (ERCE PAN)

Credit: Teemu Helonheimo/ SYKE

Funded by the European Union

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.

DOCUMENT TRACKS DETAILS

Project acronym	BioAgora
Project title	Bio Knowledge Agora: Developing the Science Service for European Research and Biodiversity Policymaking
Starting date	01/07/2022
Duration	60 months
Call identifier	HORIZON-CL6-2021-BIODIV-01
Grant Agreement No	101059438

Deliverable Information	
Deliverable number	D4.1
Work Package number	WP4
Deliverable title	D4.1 Report on the governing principles of a Science Service
Lead beneficiary	ESSRG
Authors	Eszter Kelemen (ESSRG), Zsófia Kollányi (ESSRG), Kata Fodor (ESSRG), Kármen Czett (ESSRG), Juliette Young (INRAE), Karla Locher-Krause (UFZ), Ben Delbaere (DC), Robin Dianoux (INRAE), Kinga Krauze (ERCE PAN), Alexandra Korcheva (Pensoft), Kaisa Korhonen-Kurki (SYKE), Roxanne Leberger (CREAF), Harineeswari Meenakshi Sundaram (UFZ), Marie Vandewalle (UFZ), Kati Vierikko (SYKE), Renata Włodarczyk-Marciniak (ERCE PAN)
Due date	30/06/2025
Actual submission date (update)	30/06/2025
Type of deliverable	Report
Dissemination level	PU (Public)
DOI	10.5281/zenodo.15750459

VERSION MANAGEMENT

Revision table			
Version	Revision	Date	Description
1	ESSRG	15/05/2025	First draft
2	ESSRG	02/06/2025	Updated draft internally reviewed
3	ESSRG	16/06/2025	Updated draft reviewed by T4.1
4	ESSRG	24/06/2025	Updated draft after contributions from BioAgora Consortium
5	ESSRG	27/06/2025	Updated draft internally reviewed for technical details

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Meaning / Full text
ARMT	Answering Request Management Team or Request Management Team
BD	biodiversity
BKA	Biodiversity Knowledge Agora Management Team
C4T	Cohesion for Transition
CAP	Common Agricultural Policy
CEO	Chief Executive Officer
CINEA	European Climate, Infrastructure and Environment Executive Agency
CLD	Causal loop diagram
CoP	Community of Practice
DEPE	Directorate of Collective Scientific Assessment, Foresight and Advanced Studies (France)

DG	Directorate General
DG Agri	Directorate-General for Agriculture and Rural Development
DG ENV	Directorate-General for Environment
DM	Decision maker
DT	Design thinking
EC	European Commission
ECCB	European Congress of Conservation Biology
ECR	early career researcher
EEA	European Environment Agency
EEB	European Environmental Bureau
EIONET	European Environment Information and Observation Network
EMC	Ethics and Methods Commitee
ENEA-MA	European Network of Environmental Authorities and Managing Authorities
ESEE	European Society for Ecological Economics
EU	European Union
EUBP	EU Biodiversity Platform
FAO	Food and Agriculture Organization of the United Nations
HTA	Health Technology Assessment
ICES	International Council for the Exploration of the Sea
IPBES	Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Center
KCB	Knowledge Coordination Body
KCBD	Knowledge Centre for Biodiversity

KEN	Knowledge Exchange Network
LIFE	L'Instrument Financier pour l'Environnement
NbS	Nature-based solutions
NDA	non-disclosure agreements
NGO	non-governmental organisation
NMT	Network Management Team
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
REA	European Research Executive Agency
RMT	Request Management Team
SERE	Society for Ecological Restoration
SPSI	science-policy-society interface
SR15	Special Report on Global Warming of 1.5 °C
SRI	Sustainability Research and Innovation
SSBD	Science Service for Biodiversity
TCMT	Transformative Change Management Team
TIB	Transformation and Innovation Board
UNEP	United Nations Environment Programme

BACKGROUND: ABOUT THE BIOAGORA PROJECT

BioAgora is a collaborative European project funded by the Horizon Europe programme. It aims to connect research results on biodiversity to the needs of policy making in a targeted dialogue between scientists, other knowledge holders and policy actors.

Its main outcome will be the development of a Science Service for Biodiversity. This new service will fully support the ecological transition required by the European Green Deal and the European Union's Biodiversity Strategy for 2030.

The BioAgora project was launched in July 2022 for a duration of 5 years. It gathers a Consortium of 22 partners, from 13 European countries, led by SYKE, the Finnish Environment Institute. Partners represent a diversity of actors coming from academia, public authorities, SMEs, and associations.

Funded by the European Union. BioAgora receives funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101059438.

EXECUTIVE SUMMARY

This document is deliverable of the BioAgora project, funded under the European Union's Horizon Europe research and innovation programme under the grant agreement No 101059438. The aim of this document is to explain the process and outcome of co-designing the governance framework of the European Union's future Science Service for Biodiversity (SSBD). This process was carried out in Task 4.1 of the BioAgora project and included desk research, key expert interviews with policy actors and science-policy interface organisations (reaching altogether 28 experts) and design thinking workshops both with external scientific and policy actors and consortium members (engaging over 150 participants at different events). Based on these inputs, the report outlines a potential governance structure and identifies different organisational units for the SSBD.

Empirical data outlined several best practices of existing Science-Policy-Society Interfaces (SPSIs) as well as expectations towards the Science Service as follows:

- Active SPSIs are run by separate organisational units, including:
    - High-level decision-making bodies, a central unit being responsible for the overall operative management and coordination;
    - Sub-units, such as task forces or regional chapters, being responsible for the implementation of the workplan in specific thematic areas (e.g. policy advice, capacity development) or geographical regions;
    - High-profile advisory bodies consisting of a range of stakeholders supporting the organisation with information, granting access to relevant networks, and helping ensure its credibility;
    - Expert groups carrying out knowledge-related activities (i.e., knowledge overview, synthesis or co-production). Their members are usually recruited from wider networks to participate on a voluntary (non-paid) basis. For sustained engagement of knowledge holders, there is a need to identify suitable incentives, which can vary among stakeholder groups.
- Engaging diverse stakeholders in SPSIs is an important aspect of knowledge co-production: being able to shape research questions and priorities from the start and being able to respond to stakeholder input as the project progresses. An agile way of working and the early and continued engagement of policy-makers in the process are identified as critical for knowledge co-production.
- Few organisations reported having embedded ethical infrastructures – a structured set of ethical measures – to support their activities. Common elements included conflict of interest declarations, non-disclosure agreements to ensure confidentiality of ideas and shared resources, and formal vetting processes to select participating experts. However, ethical considerations extend beyond these features. Other crucial aspects of a robust ethics framework which should be included in the SSBD include issues like representation, transparency, objectivity, and voluntary work.

Ensuring policy relevance and achieving policy impact are two strongly interlinked aspects of SPSI activities. While the same organisational solutions or internal processes can often help achieve both of these objectives, they can still be separated into two layers, the one building on the other (i.e. an SPSI product can be relevant for policy, but not necessarily achieve a significant policy impact, but to achieve significant policy impact an SPSI product must also be policy relevant).

- In terms of science being relevant for policy, the main conditions are for science to reflect actual policy objectives and information needs in a timely manner, in a digestible format, and

that it is not just received and understood but also trusted by policy-makers. An important issue is the role of science in the knowledge co-creation process, which may be perceived differently by policy-makers and scientists.

- In terms of supporting the design of successful policies, the three main conditions raised are the inclusion of knowledge of different scientific disciplines (interdisciplinarity), different societal actors (transdisciplinarity), and harmonisation across different sectors (cross-sectoral).

Based on these considerations, we offer a compact governance model for the SSBD with three main permanent bodies and two types of single-task oriented temporary bodies, as follows:

1. Transformation and Innovation Board: ensures the transformative potential of the SSBD by linking its activities to policy priorities, anticipating policy relevant topics, and supporting mainstreaming.
2. Network Management Team: facilitates the knowledge exchange networks of the SSBD, through which experts participating in its permanent and temporary bodies can be recruited and knowledge needs can be fulfilled.
3. Request Management Team: manages the processing of knowledge requests from the pre-submission dialogue to the dissemination of the results and the internal evaluation of the process.
4. Expert groups with thematic, methodological or ethics focus (groups of voluntary, unpaid experts working on a specific task for a pre-defined period of time).
5. Knowledge Exchange Networks: bring together knowledge providers and knowledge users around a specific topic.

To ensure that the SSBD is a lean and agile organisation, and at the same time remains inclusive and transparent, the following structural and procedural solutions are offered:

- Both permanent and temporal bodies represent diverse voices and are balanced across gender, age, geographical and disciplinary backgrounds.
- Operative bodies are represented at the level of strategic decision-making with equal weight.
- At least two ethics experts or ambassadors, having a seat in the permanent bodies, and an ethics expert group support and oversee the work of the SSBD to ensure ethical compliance and risk management.
- Time-bound, operative decisions follow pre-established rules of procedure while strategic decisions are based on consent.

The governance model outlined in this report represents a consent-based approach that was co-created over a 3-year process, and as any other potential organisational setups, it also comes with certain trade-offs. To bring the SSBD's governance structure to life, a deeper ethical analysis, further testing, and careful formalisation of internal procedures are needed

NON-TECHNICAL SUMMARY

Knowledge can be shared and co-created across science, policy and society through a diversity of organisational structures and processes. The chosen structures and processes shape the nature and type of knowledge created at the interface as well as its relevance for and adoption by policy-makers. Previous analysis and the current research conducted under the BioAgora Horizon Europe project show that science-policy-society interfaces (SPSIs) are more effective at creating policy-relevant and credible knowledge if they function as iterative and collaborative processes, where researchers and other knowledge holders work hand-in-hand with policy-makers in a non-linear, co-productive fashion. While previous analysis focused more on defining and characterising the basic requirements for non-linear knowledge production at the interface, there has so far been little investigation into the kind of governance structures and processes that could facilitate such knowledge co-production. Based on a co-design process and semi-structured interviews with representatives of leading international SPSIs, this report aims to fill this gap and outline a general governance model for transformative SPSIs. It introduces the alternative governance frameworks that were co-created within BioAgora and presents the model that was finally selected for the future Science Service for Biodiversity (SSBD).

This report identifies transformative SPSIs as lean and agile organisations that can dynamically respond to emerging policy needs, new scientific findings, and stakeholder input. They effectively engage a diversity of actors (including researchers of diverse backgrounds, various societal actors, and policy-makers of different sectors) in a sustained fashion. Ethical principles related to confidentiality, participation, transparency, objectivity, and renumeration are embedded in the structural processes of the organisation. Critically for policy impact, knowledge co-produced at the interface arrives in a time and format adoptable by policy-making and trusted by its users. Based on these considerations, the report recommends a compact and cost-effective governance model with three permanent and two temporal structures. Permanent structures ensure mainstreaming and the linkage of activities to policy priorities; facilitate the management of knowledge-exchange networks; and manage knowledge requests. Temporary bodies include expert thematic, methodological, and ethics groups and knowledge exchange networks formulated according to the dynamic needs of the interface. All bodies represent diverse voices in terms of gender, age, geographical and disciplinary background. Naturally, the proposed organisational structure comes with inevitable trade-offs, and to actualise its transformative potential, it must be subject to further testing and analysis as it comes to life.

Table of contents

LIST OF TABLES

LIST OF FIGURES

1. Introduction and methodology

Task 4.1 of the BioAgora project aimed to set up the governance framework of the future Science Service. To achieve this objective, Task 4.1 activities included: 1) data collection with the aim of learning from the best practices and understanding better the current SPSI landscape, including the needs of the potential users and the services provided by other existing initiatives; and 2) co-designing the governance framework through workshops, including the scientific community as well as the key stakeholders (potential future users and collaborators). Through this two-tiered approach, we aimed to tailor the governance of the Science Service to existing needs, and to avoid overlaps with already existing initiatives.

The main objective of this report is to provide sound conceptual and empirical foundations for choosing the most suitable governance framework for the SSBD by:

- identifying key principles / values of the SSBD
- learning from best practices
- identifying expectations of key stakeholders and potential partners
- co-designing the governance structure with consortium members and key stakeholders in an iterative manner

This report shares the main lessons learnt through our 3-year journey. First it summarises relevant findings of the most recent literature on how science-policy-society interfaces can best serve transformative change (section 2), and then it explains the research and co-design process (section 3). This is followed by our empirical results with a special focus on the expectations the SSBD should meet (section 4). Based on these inputs, section 5 outlines a general governance framework as well as three alternative governance models which could fulfil the role and functions of the Science Service. In its closing section, the report introduces the model which was finally selected.

2. Conceptual background

2.1 Knowledge brokering across science, policy and society

Considering science-policy-society interaction in a broad range of sectors, there is no ultimate form of how knowledge brokering is carried out – rather, it is a colourful landscape of different processes, actors – organisations and individuals –, as well as institutional solutions engaging in activities that aim to "translate" and deliver knowledge from the place of its origins to where it can and will be utilised – in our case, in the sphere of policy-making. Knowledge brokering activities are being carried out by actors in a wide variety of organisational forms, topical focus, sizes, methods, business models, governance structures, and so on. The definitions in the field being remote from clear-cut, even lobbyists and other interest groups (or profit-oriented firms forming these) are sometimes considered as knowledge brokers (OECD, 2017).

The two main aspects of a possible typology of knowledge brokers, as discussed in detail in BioAgora Task3.4, could be the policy area in focus, and the organisational form – while the two seem to be not independent. As a clear pattern, the term comes up dominantly either in health-, or in environment-related areas (MacKillop et al, 2020). Here, however, a sharp difference can be made between different disciplines, which leads to another important, epistemological characteristic of the knowledge brokering landscape. Though in recent years, the interest in knowledge brokering (as an umbrella term) is increasing everywhere, in the field of social sciences and public health, they often use phrases like "bridging the gap", and in health care in general the term "translation"[1]. These phrases imply that the real problem is that there is some kind of a physical or language barrier between the worlds of knowledge and policy that knowledge cannot get through, and the only task is to bridge this gap or translate the foreign words into accessible concepts – anyway the knowledge itself is ready to be taken up. And in a sense, this is true – the scientific results of these fields are indeed often instantly usable for policy-making, as the problems they address, the methods they use, the outcomes they have share the same target as policies: the behaviour of people, organisations and societies. When natural sciences are also involved in policy-relevant fields, however, things get tricky – and this is especially the case with environmental issues. Here, major parts of the problems clearly require natural science knowledge, however, natural science usually misses the social impacts of both environmental issues and environmental policies, especially how behaviour change, which is inevitably part of policy making, can be achieved. Consequently, there is no single scientific discipline being able to provide the totality of the necessary knowledge base.

Regarding organisational form, the question is the level of integration of the science service activities with the policy-making process, and if – in case of an independent organisation – it is dedicated entirely to brokering activities, or if it is just one part of the activities carried out.

In terms of the level of integration with the policy-making process, typical forms are for the policy-making infrastructure to include a branch dedicated to research or to knowledge brokering directly, in an in-house manner. In case of the EU, Joint Research Center (JRC) institutions in different policy areas serve such a purpose – as included in JRC's Mission Statement (JRC, n.d.): "The JRC provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society" –, however, depending on the characteristics of the disciplinal area and resources available, this goal can be fulfilled to a varying extent.

Another form of integration of "knowledge brokering" in the decision-making process is when producers of new knowledge themselves bring it in. This has always been and is still happening often in a non-transparent form of lobbying and other activities of – typically market based – interest groups. There are attempts to make this process more transparent. The typical case of this is the field of innovative health care technologies and medications – to support the decision whether to approve these or to include in public reimbursement, production companies (typically the developers of the new technologies) have to provide thorough, transparently documented and organised evidence in a health technology assessment[2] (HTA) process. The history of HTA may shed light on the struggles of evidence-based policy-making in a complex field of interests. It was first developed in the US in the mid-1970s, with the focus on efficacy, safety, and cost-effectiveness of products (Banta – Jonsson, 2009), developing a unanimous agreement of scholars about its necessity over the decades (Löblová, 2018). Still, there is often strong, interest-driven resistance towards establishing HTA in a country's

[1] In the PubMed database (the largest database for medical and health-related science, operated by the National Library of Medicine at the National Center for Biotechnology Information, USA), though both show a similar, increasing pattern, in the year 2024, 6665 records fitted the search term „knowledge translation", and only 121 „knowledge brokering"; 10 years earlier, in 2014, the same figures were 1709 and 35.

[2] „Health technology assessment is a scientific, evidence-based process that aims to inform the creation of safe and effective health policies by summarising information about the medical, social, economic and ethical issues related to the use of a health technology." (EU, 2025)

health policy system, from the side of different stakeholders including policy-makers as well as industry (Kaló et al., 2016; Löblová, 2018; Banta, 2003).

On the one hand, organisations engaged in knowledge brokering that operate independently from policy-making can be (and, in an increasing number of cases, are) organisations specialised specifically in the niche of knowledge brokering and can be regarded as policy entrepreneurship (MacKillop et al, 2023). These organisations often do not focus on one policy area but provide services in a broader range of fields. On the other hand, scientific organisations, covering a wide range from (public or private) academic research institutes through universities to think-tanks, carry out research but are also engaged in policy-relevant activities at least by communicating their results, producing policy documents or providing counselling. This, however, leads back to the issues of policy field, relevant knowledge and appropriate methods, as most academic research institutes are specialised in one disciplinary area. Environmental policies need the knowledge of different areas of natural sciences as well as of social sciences, operating often in a scattered way, providing relevant pieces to the puzzle, but the task is more than just putting them together. On the contrary: according to a vast body of policy research, transdisciplinary research and co-creation of knowledge is needed, including not just scientists from different fields (Belaïd – Unger, 2024) but also societal actors (Rozance et al., 2020) and policy-makers (McGonigle et al., 2020). As McGonigle and his colleagues say, *"… Decision-makers and researchers need to work together to help untangle, contextualise and interpret fragmented evidence through systems approaches to make decisions in spite of uncertainty."* This unique characteristic of environmental policies can explain why knowledge brokering in this field is happening as it is, often focusing on certain areas and involving a broader range of experts and methods. Also, it implies certain characteristics that science service organisations – for instance – in biodiversity must have.

2.2 From knowledge brokering to co-production

Science-policy-society interfaces (SPSI) can be considered as a special form of knowledge brokering organisations. They provide an opportunity to synthesise available scientific and other forms of knowledge on a given topic (sector) and incorporate this synthesised knowledge into policy decisions by outlining different options and long-term scenarios. The SPSI is more than knowledge brokering, more than the linear transmission of credible, reliable, scientifically supported information to policy-makers (Young et al., 2014). It is an iterative, collaborative, non-linear process that considers policy-makers, researchers and other knowledge holders as partners and reaches final recommendations through knowledge co-production (Heink et al., 2015; Sarkki et al., 2015). Although joint knowledge creation is time- and resource-intensive, and some researchers argue that it produces results that are difficult to generalise (Sutherland et al., 2017), others argue that it is the only way to bridge the gap between knowledge and implemented decisions and ensure that political decisions actually result in more environmentally sustainable and socially just outcomes (Salomaa, 2018; Wyborn et al., 2019).

SPSIs can operate in a variety of organisational forms (Kelemen et al., 2021), from loosely coordinated network structures to organised platforms operating according to strict rules (Görg et al., 2016). The network approach assumes an open and flexible connection between individual actors, where organisations and individuals can voluntarily join the knowledge co-production process, taking place within thematic networks through a centrally located intermediary. In contrast, the platform approach involves a more hierarchical and formalised collaboration, where participants fulfil specific roles for a specific period of time, and the different roles are associated with clear rights and responsibilities (Görg et al., 2016). A third, more strongly interlinked and problem-focused approach can be observed in policy innovation labs, where the goal is not only to support decisions based on scientific information, but also to co-create innovative public policy solution (e.g. new legislation or regulatory framework) (Wellstead et al., 2021).

The SPSI expects participating researchers to engage in research practices that differ from basic research, which can be interpreted as boundary spanning (Bednarek et al., 2018). While the main task of researchers remains focused on content, i.e. to provide relevant knowledge and expertise to policymakers, new functions are emerging. These include the mediation between different scientific disciplines and non-scientific forms of knowledge, and the facilitation of the co-production and use of shared knowledge, where the emphasis is increasingly on process rather than content (Turnhout et al., 2013). Depending on the extent and form of researchers' engagement with policymakers, they can act as "arbiters" of science, synthesising the available information on a given policy issue and formulating concrete proposals; they can act as "advocates" for a given cause, considering the implications of research for a given policy course and narrowing down potential options in the interests of the cause; or they can act as "knowledge brokers", who use scientific knowledge to search for decision alternatives as widely as possible and also explore the possible impacts of decisions (Pielke, 2007).

In whatever role researchers participate in the science-policy-society dialogue, the co-production of knowledge and its integration into decisions is always intertwined with the issue of power. Turnhout et al. (2020) argue that knowledge co-creation in the SPSI often falls victim to the assumption that the positions of participants are neutral, that is, political differences and competing interests are ignored, and that all participants are guided by objective scientific rationality. This principled (expected, but in most cases unfulfilled) neutrality is particularly reinforced when participation in joint knowledge creation is concentrated on elites, when scientific consensus takes precedence over the equal presentation of different opinions and the constructive debate that develops between them, and when science-policy-society interaction takes place in the framework of fixed-term projects that are not organically embedded in the power system (Turnhout et al., 2020). This depoliticised view of the SPSI considers scientifically based decision-making to be a rational process – but decision-making is always a political act, in which different values and interests clash (Gordon et al., 2013). This neutral approach is even less valid for issues where scientific uncertainty is high, and the consequences are unpredictable. According to the post-normal science view, in critical topics, such as climate change or biodiversity loss, researchers are also forced to make value choices (Funtowicz and Ravetz, 2003). Scientists themselves are part of their subject of study and "fight for their own valid truth" among competing interpretations (Szabó, 2014: 129). Also, a distinct feature of public policy formulation is the presence of policy monopolies, a set of actors with "*a definable institutional structure, responsible for policymaking in an issue area*", who are considered as responsible by external actors as well, based on a powerful idea (True et al, 2007: 159). These monopolies resist change, not only in terms of policy content, but also meaning who can have access to the policy process, possibly affecting what scientific fields or knowledge areas are considered as relevant and competent.

2.3 Transformative SPSIs need transformed organisational structures

Global environmental science-policy-society interfaces (SPSIs), such as the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES), the Intergovernmental Panel on Climate Change (IPCC), or Future Earth, call for transformative change to combat the intertwined climate, biodiversity and health crises. Effectively pursuing transformative change requires scientific research, and science-policy-society interactions too, to shift from exploring and understanding ecological processes to more solution oriented and dialogical ways of working together (Berg and Lidskog 2024, Horcea-Milcu et al., 2024). Co-producing knowledge is key to make SPSIs more transformative (Sarkki et al., 2025), including not just scientists from different fields (Belaïd and Unger, 2024) but also societal actors (Rozance et al., 2020) and policy-makers (McGonigle et al., 2020). Kayhkö et al. (2025) suggest that co-production can either be demand-driven, when specific

instrumental knowledge is created to combat certain societal challenges, or focus on transformative sensemaking, when, instead of quick solutions, societal transformation is targeted to address the underlying causes. Beside identifying best practices and promising pilots that foster transformation, SPSIs should also confront the political, economic and societal actions which cements the status quo (Preisser, 2025).

The question is, can SPSIs – as they are currently organised and function – meet the above expectations of transformative interfaces? A recent literature review and expert elicitation identified participatory and multidisciplinary approaches, collaboration and social learning, and iteration and deliberation among diverse values and types of knowledge as the most agreed and enlightened claims towards SPSIs (Jagannathan et al., 2023). The same study, however, also highlighted misguiding (and strongly debated) claims, e.g. that SPSI processes are linear and scientists act as apolitical actors at the interface. This ostensible tension can be traced back to the organisational structures and the formal and informal rules that govern interactions at the SPSI. Through the structured epistemic analysis of the IPCC special report on the impacts of global warming of 1.5 °C (SR15), Berg and Lidskog (2024) found that the choice of the methodological framing (pathway models) resulted that greenhouse gasses (GHGs) become the main epistemic object of the report. This further led to the prioritisation of technological solutions that can directly and measurably modify the concentration of GHGs (which fits into the current growth-oriented mindset), instead of more transformative options questioning capitalism, economic growth, or the globalisation of supply chains. They conclude that the assessed IPCC report, through its epistemic rules and culture, stabilises current unsustainable trends and creates path-dependency, because a more critical standpoint would be considered normative (policy prescriptive) (Berg and Lidskog, 2024: 9). Turnhout (2025: 3) goes even further, arguing that *"the norms of neutrality and relevance provide strong incentives to refrain from this [the open questioning of dominant political and scientific framing] as this would not just risk losing policy relevance, but is also likely to be seen as political, thereby risking loss of authority."* All this suggests that SPSIs in their current form are more part of the status quo than the agents of change, and thus, making them more transformative requires new governance structures and processes which focus on pluralism, justice, and the conscious reorganisation of power structures (Subramanian et al., 2025).

Organisational innovation rarely comes from outside the private sector. The public sector is generally considered as "too bureaucratic, too stable, stagnant, and conservative", while innovation happening inside them is "slow, fragmented, and asynchronous" (Maqdliyan & Setiawan, 2023), and academia seems to be even more rigid, still relying on foundations and structures built hundreds of years ago. In the private sector, it is now accepted that organisational innovations can be at least as valuable in financial terms as technology or product innovations: the question of *how* we do it being at least as important as *what* we do. The focus of organisational innovations in the past twenty years has shifted from directly improving efficiency and production towards finding organisational structures that are flexible, adaptive, and foster creativity, reflecting not just organisational interests but also the increasing will of contemporary employees for autonomy, responsibility and flexibility instead of control (Khoury et al, 2024). The main characteristics of innovations aiming for these goals are the breakdown of hierarchical structures and the extensive empowerment of employees (Czekaj et al, 2020). It can take several different forms, while the main characteristic is "flattening" the hierarchy to creating a more equitable distribution of authority (Lee – Edmonson, 2017). "Lean" and "agile" organisational structures, "liberated companies" and several other organisational forms (and sometimes different terminology used for very similar features) are now prevalent in many industries, especially in the information, communication and technology sector. The keyword "agility" refers to the ability of the organisation to flexibly adapt to a rapidly changing environment and answer sudden needs, while remaining stable. Organisational structures where all units of the organisation are connected with each other, but still bear the responsibility for end-to-end tasks, can enable such agile operations. "Lean" is defined mostly in terms of efficiency, focusing on continuous improvement, minimising failures, and optimising resources and processes. A key feature of lean organisations is the

empowerment of employees, by giving them autonomy and freedom to enable creativity and the emergence of ideas and solutions.

A distinct, still very flexible, thus diverse organisational and governance framework ensuring the conditions of efficiency and autonomy described above is often called sociocracy. The main focus here is on the decentralisation of authority and the replacement of hierarchical manager-subordinate relationships by a more horizontal structure (Schell - Bischof, 2022). The guiding principle of all operations and actions in such decentralised organisations is not the directives of leaders, but the purpose of the organisation itself.

In contrast with democracy, in a sociocratic organisation, decisions are based not on the majority vote but on consent. Consent should not be confused with consensus - while in case of consensus, veto is an option, in case of consent, objection to a decision is acceptable only if it supports with logical arguments that the decision in question may endanger the ultimate goal of the organisation (Eckstein, 2016). This shared decision-making, based on consent, is the first principle of sociocracy (Romme, 1995). It also has to be noted that this decision-making process also can give way to other decision-making methods, from autocratic to democratic, in which case it is also based on consent to choose another way of making a decision.

The second principle is that the basic structure of a sociocratic organisation is a circle. The circle is a semi-autonomous group of people responsible for a certain task, working towards the common aim of the organisation, in a sociocratic manner. Calling these units a “circle” is also symbolic: the circle is the most ancient way of how people have gathered together to discuss their issues, find solutions, or just listen to stories. In a circle, everyone is equal: the circle mitigates power imbalances and enables the inclusion of diverse worldviews, making common sensemaking and the creation of shared values possible, thus giving access to the wisdom of many (Surowiecki, 2004). However, circles are not just a place of talking: they are efficient and flexible operative units, solving problems and tasks they are mandated to. Also, circles have a facilitator or “secretary”, handling operative issues.

The circles are connected through double linking (Figure 1), which is the third principle of sociocracy: each circle delegates representatives in other, relevant circles and vice versa, thus ensuring connectedness of, and the flow of communication between, different parts, and that consent spreads across the whole organisation. Ideally, at least two representatives should link every circle, one of which may be appointed by a higher-level circle or organisational leadership, and the other is elected from inside the circle itself, based on consent. The fourth principle of sociocracy is that election have to be based on consent.

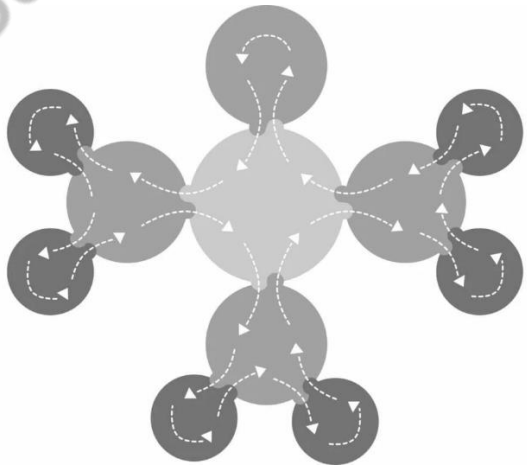

Figure 1.: Structure and connectedness of circles in sociocracy

Source: https://www.sociocracyforall.org/organisational-circle-structure-in-sociocracy/

Besides these four basic principles, which all can be applied in a flexible manner, others list additional guiding rules like empiricism (as in testing all assumptions empirically), accountability and the involvement of affected parties in decisions. Some other, more technical solution of the framework contribute to effective, efficient and transparent operation, for example the facilitation and recording practices of sociocracy.

3. Methodological approach

3.1. Design thinking as the overall methodological framework of this study

Since the objective of Task 4.1 was not purely scientific, but rather action-oriented, we applied different methods (i.e., desk research, semi-structured interviews and workshops) and combined them in a design thinking frame.

Design thinking (DT) is defined as "*a human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success*" (Brown, URL). Some sources define DT as having important complements to scientific thinking, especially because of its creative characteristics and non-linear approach (Owen, 2007). In order to better understand how DT works in practice, one should first realise the two major types of creative thinking which characterise all of us: divergent and convergent thinking. While some people are masters of "discovery" (i.e. understanding a given situation by analysis as much as possible and draft a huge range of diverse directions which could be followed), others like focusing on the "doing" (i.e. assessing and narrowing down the list of available options and selecting the best possible solution) (Owen, 2007). Mainstream education focuses mostly on improving convergent thinking, but divergent thinking is equally important in real life problem solving as it can lead to new choices that probably have not existed before. In case of wicked problems, where many stakeholders are present, the situation is complex and continuously changing, and there is no outcome fit for all – just as in the case in most biodiversity-focused decisions – finding the most suitable solution requires the application of both divergent and convergent thinking.

Design thinking incorporates an iterative and collaborative process where the applied tools and approaches stimulate both divergent and convergent thinking, depending on which phase in the process we are (Tschimmel, 2012; DesignCouncil, 2019). The Double Diamond model – one of the most well-known among several existing models of DT – offers a four-step approach leading us from the challenge to the outcome (DesignCouncil, 2019). First, by collecting information and inspiration, we discover the situation and better understand the challenge ahead of us together with its context and interrelations with other problem areas. This first phase is about divergent thinking – analytical tools and creative thinking are used to bring in as many potential understandings / explanations of a given situation as possible. Once we think we understand the problem at hand, we narrow down our focus to one particular issue to resolve and define what is in the focus of the innovation process. This second phase is for convergent thinking – analytical and evaluation tools as well as strategic thinking are used to define the social need in the centre as well as the key criteria for suitable solutions. Once we arrive at a well-defined target, the process leads us to generate new ideas and develop possible solutions. Divergent thinking enables us here to ideate in a wide range of solutions – everything can be acceptable, including pragmatic solutions already in use, as well as odd, non-functional, out-of-box ideas which have never been tested yet. When the pool of potential solutions is wide enough, we turn to the fourth phase of the process by screening the alternatives, creating prototypes and testing their applicability, to deliver the final outcome. This phase is again about convergent thinking, that is,

analytical and evaluation tools can be used to focus the process on practical implementation. Iteration is a key principle throughout the whole process, as it helps improve both the problem-framing and the solution-seeking phase. Therefore, feedback loops within and across the four steps allow switching from more divergent to more convergent thinking and vice versa many times, even within the same step. Figure 2. summarises the main steps of co-designing the SSBD's governance model in a design thinking framework, and the next subsections explain the main methods used for data collection and analysis.

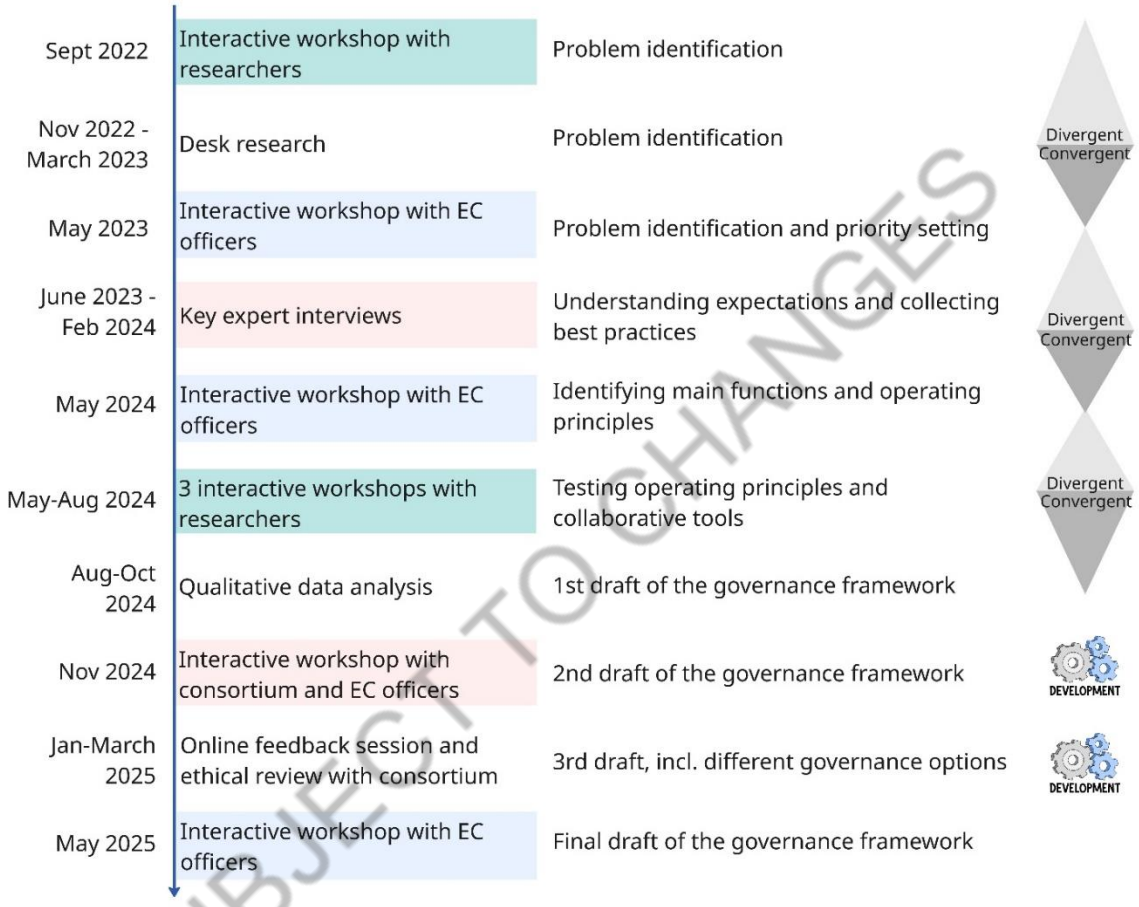

Figure 2: The process of co-designing the governance model of the Science Service

(Light blue = engagement with policy-makers; Turquoise = interactions predominantly with researchers; Rose = involvement of both policy-makers and researchers).

3.2. Data collection and knowledge co-creation with interviews and workshops

3.2.1. Expert interviews

In Task 4.1 of the BioAgora project, semi-structured interviews were carried out between June 2023 and February 2024 with 16 key stakeholders, being relevant either as potential future users of the SSBD, as key collaborators with whom SSBD functions can be jointly carried out to avoid overlaps, or as already well-functioning science-policy interfaces which can be used as a role model for the SSBD.

Interviews had a strong partnership building objective besides collecting information, therefore in most cases, project coordinators or members of WP leadership were also present during these dialogues, and the interviewed organisations were also represented by several people taking different roles at the given organisation. Therefore, with the 16 interviews we reached 28 key experts in the field. Interviews were carried out online and were recorded and transcribed whenever the interviewees provided their consent. Interviews lasted between 40 minutes and 2 hours. Table 1 presents the interviewed organisations according to their main profile.

Table 1: Key expert interviews

Interviewed organisation	No. of participants	Rationale for selection
EC DG Agri	2	Potential user of the SSBD
EC DG Clima	1	Potential user of the SSBD
EC DG Ener	1	Potential user of the SSBD
EC DG Regio	3	Potential user of the SSBD
CINEA	4	Data provider, potential collaborator of the SSBD
EEA	3	Data provider, potential collaborator of the SSBD
Future Earth	1	Global sustainability SPSI, potential collaborator of the SSBD
IPBES	1	Global biodiversity SPSI, potential collaborator of the SSBD
ICES	1	Global marine SPSI, potential collaborator of the SSBD
UNEP	1	Global biodiversity policy platform using scientific input, potential user of the SSBD
Alternet (test)	2	EU-level research network, collaborator of SSBD
Biodiversa+	3	EU-level biodiversity research funder and SPSI, collaborator of SSBD
EEB	1	EU-level NGO network potential collaborator of SSBD
Eklipse	1	EU-level biodiversity SPSI, collaborator of SSBD
OPPLA (test)	1	EU-level research platform, collaborator of SSBD
DEPE	2	French national level SPSI, best practice example

In other tasks of the project, further interviews were organised with some other relevant stakeholders, which although covered different topics, included some relevant questions for this analysis (i.e., Task 1.1 interviews (6 transcripts) with a dedicated section on expectations towards the SSBD, and Task 5.1 expert interviews (4 transcripts) with a dedicated section on the potential added value of the SSBD). These interview segments were not added to the corpus of the qualitative analysis, but we used them to cross-check the emerging key topics and to corroborate the main findings.

After transcribing the recorded interviews and cleaning the transcripts, interviews were analysed in a qualitative-iterative way, using a deductive coding approach.

- First, a deductive coding structure was developed based on conceptual literature, including three parent codes and 4-6 child codes in each main category (Table 2).
- Second, this deductive coding structure was tested on three selected excerpts by three coders. After the test coding, the three coders convened to compare their individual usage of the codes, based on which the codes were refined, and a commonly agreed coding procedure was developed.
- Third, all the interviews were divided between the three coders (each of them coding 5 to 6 interviews). Coders met two times during the coding process to enable the cross-checking of the coded segments and to ensure intercoder reliability. During this phase, all coders used their own online qualitative analysis software (NVivo, Atlas.ti, and MaxQDA). When all the interviews were coded, coded quotes were exported from the different software and compiled in a MS Excel document. Then coders met again for a final inter-coder reliability check and made some final modifications in their coded quotes (using the compiled MS Excel document) based on their common agreements.
- Fourth, the finalised coded quotations for the three coders, listed in the MS Excel document, were integrated and fed into the Atlas.ti software. This allowed the joint analysis of all the interviews using one single software (i.e., frequencies and co-occurrence analysis, network analysis etc.)
- Fifth, a larger group of collaborators was convened to interpret the results of the coding for each of the three parent codes.

Table 2: Interview codebook

(numbers in brackets indicate the frequency of the given code, i.e. how many quotations were coded with the given code)

Category	Code	Definition	Emerging sub-topics
Biodiversity SPSI landscape	Keeping key actors engaged (n=73)	The way the interviewed organisation collaborates with its key connections and keeps them engaged. These might include communication practices, engagement tools and techniques, regular events etc.	Relevance and timeliness Formal and informal ways of engagement Transdisciplinary, inclusive and co-creative processes Conferences and workshops
	Key connections (n=99)	Organisations, networks or individuals mentioned during the interview as key connections (collaborators, partners) of the interviewed organisation. When coding, you can refer to specific actor groups and to the nature of the connection (e.g. joint projects, supplying information etc.)	Collaboration on policy issues Cooperation for data sharing, system integration and policy support Knowledge transfer Cross-sectoral policy implementation
	Role in EU BD policy	Connections between the interviewed organisation and KCBD, EUBP,	Encouraging sustainable land use through incentives and legal rules

	(n=64)	Biodiversity Partnership, Biodiversa+ or similar initiatives which operate at the EU level and try to enhance the implementation of the BD strategy.	Providing data, knowledge and policy support Bridging different actors
	Weak or missing connections (n=29)	Organisations, networks or individuals mentioned during the interview as weak or missing connections, although it would be important for the interviewed organisation to connect to them.	Disconnection from practice Lack of cross-sectoral communication and collaboration Lack of understanding evidence-based information
Expectations towards SSBD	Added value (n=40)	What could differentiate the SSBD from other already existing initiatives? What was seen by the interviewee as an added value of the science service?	Recommendations based on existing research and tailored to stakeholders Direct exchanges with experts Identification of gaps Impact on what future research should be carried out Stakeholders involved One-stop shop Strengthen the message on biodiversity
	No go lines (n=6)	What should not be done by the SSBD? Are there any functions or services which must be managed by other actors and not by the SSBD?	Not simply being a service to policy Working jointly with policy-makers Avoiding competition with others Appropriation Going beyond biodiversity
	Potential areas of collaboration (n=30)	What kind of relationship was envisioned by the interviewee between her organisation and the SSBD? Were there any particular areas of collaboration listed?	Collaboration with policy-makers Collaboration with experts Collaboration with Member States Collaboration with civil society Collaboration with other networks
	Target groups (n=25)	How did the interviewee(s) define the core target group of the science service?	Policy actors (politicians, policy officers in EC and national ministries) Civil society Farming and business community Linking to national and subnational scales
	Targeted activities, functions (n=54)	Which functions or activities were mentioned by the interviewed organisation as potential "services" of the science service?	Centralised platform of existing research for stakeholders Direct consultations with experts Engaging with others in the SPSI (civil society, other sectors…) Research priorities that are accepted in policy-making Bringing biodiversity centre stage Capacity-building Fast requests
	Transformation (n=20)	How can the SSBD contribute to transformative change? Which role should it play to transform biodiversity policy-making? Also, what kind of	Bridging the gap between science and practice

		transformation would be needed at the EU-level?	Increase scientific input into policy and decision-making and recognition of work at SPSI Transformation of science
Expectations towards SSBD	Ensuring relevance (n=72)	Measures applied by the interviewed organisation to ensure that relevant knowledge is accessed / provided in a timely, robust and reliable way, and that such knowledge responds to specific needs.	Reflecting policy needs and reaching decision-makers Timing and timeliness
	Ethical measures (n=11)	Measures applied by the interviewed organisation to resolve ethical challenges such as conflicts of interest, favouritism, bribes, discrimination, falsification of documents, misuse of evidence, influence peddling.	Ethical infrastructure Vetting procedures Representation Transparency Objectivity Voluntary work
	Governance processes (n=93)	Internal processes of the interviewed organisations, either formalised or spontaneous, that support decision-making and implementation. These include internal communication, task division and management, as well as processes to make strategic decisions or to select the leaders of the organisation.	Identifying knowledge needs: anticipating and scoping Knowledge brokerage Engaging diverse actors and enhancing their capacities Monitoring policy implementation
	Governance structures (n=41)	Governing bodies of the interviewed organisation which make and implement decisions, as well as the relationships between them. These could include e.g. board of directors, board of advisors, specific task forces, working groups or units with specific tasks. Pay attention to qualitative aspects of governance, i.e. path-dependence, centralisation of power, hierarchies, bureaucracy.	Decision-making bodies Management bodies Advisory bodies Expert groups
	Including diver-se knowledge (n=44)	If and how different knowledge holders are engaged in co-creating outcomes. Who are considered as knowledge holders, and how their knowledge is harvested (one-way knowledge provision -- mutual exchange -- co-production)	Who are considered knowledge holders How can knowledge be co-produced, synthesised and shared Outputs of knowledge processes
	Reaching policy impact (n=74)	Best practices mentioned by the interviewed organisation on how policy impact can be achieved.	Understandability, communication and language Trust Place and role of science Knowledge management and internal mechanisms of science Coordination during policy formulation
Open	Gaps and	Gaps or challenges to address	No subtopics identified

	challenges (n=10)		

3.2.2. Workshops

3.2.2.1. Co-design workshops with policy officers and with the consortium

Three design-thinking workshops were organised with EC policy officers to make decisions collaboratively on different aspects of the SSBD, such as which functions it should fulfil, which principles it should follow, which governance units it should include, and who should host the future SSBD. In addition to these workshops, the author team organised an interactive session for other consortium members to evaluate different options at hand. Some basic information on these workshops is shared in Table 3, while workshop guidelines are included in the Annex. Since each of these workshops followed a specific structure targeted to the given phase of the co-design process, and served mainly the goal of making well-informed, joint decisions instead of collecting empirical data, these workshops are not explained in more detail here (their summaries are restricted to internal use).

Table 3: Basic details of the co-design workshops

Workshop	Date	Participants	Main objective
1st EC workshop	25th May 2023	Colleagues of DG ENV, REA, KCBD and BioAgora (n=17)	Brainstorm on potential functions and underlying principles of the SSBD, prioritise future activities
2nd EC workshop	30th May 2024	Colleagues of DG ENV, REA, KCBD and BioAgora (n=26)	Discuss and clarify expectations, narrow down the needs to be targeted by the SSBD
Consortium workshop (in person)	13th November 2024	BioAgora consortium members, REA, KCBD (n=40 approximate number as not all meeting participants joined the break-out groups)	Discuss the first version of the SSBD governance framework, identify and evaluate alternative options for three organisational units
3rd EC workshop (hybrid)	6 May 2025	Colleagues of DG ENV, REA, KCBD and BioAgora (n=34)	Discuss the second version of the SSBD governance framework, evaluate three options for hosting the SSBD

3.2.2.2. Design thinking workshops with research communities

These interactive workshops (Figure 3) aimed to apply a design thinking approach to i) assess and co-design processes and tools that enable knowledge co-creation in the SPSI; ii) discuss appropriate participatory processes; and iii) identify barriers to inclusive policy-making. The workshop structure

stimulated hands-on experiences of participating in science-policy-society interactions, focusing on a specific biodiversity-related problem from the perspective of diverse stakeholders. The target group was external researchers from a diversity of fields; therefore, the workshops were conducted at various conferences. The details of the workshops organised for external researchers are summarised in Table 4, including a preparatory workshop organised in 2022 to better understand the challenges researchers face when engaging in SPSI-related work.

Thematically, each workshop revolved around an imaginary case study related to a certain Knowledge Exchange Network (KEN), which are operational thematic networks in the field of biodiversity, related to, and partly emerging from the work conducted by Demonstration Cases in the BioAgora project. The three topics/KENs addressed at the workshops were marine, nature-based solutions (NbS), and freshwater. These case studies were developed as part of a collaboration between BioAgora early-career researchers working on Task 4.1 and on a certain KEN. All case studies were based on real-life biodiversity-related issues from around Europe that concern a variety of diverse stakeholders, therefore it is hard to find a consensus- or even consent-based solution:

- the marine KEN case study explored the complex challenge of reconciling biodiversity conservation with traditional livelihoods in the Wadden Sea – particularly around the controversial, but culturally important practice of bottom trawling in marine protected areas;
- the NbS KEN case study asked participants to navigate the risks of green gentrification while designing an urban park in a low- to middle-income neighbourhood of an imaginary city, emphasising the need for co-created, equitable nature-based solutions that enhance biodiversity without displacing vulnerable communities;
- and lastly, the freshwater KEN case study invited participants to deal with the complex trade-offs between ecological restoration and economic interests when developing stakeholder-informed strategies for managing an imaginary river under the EU Nature Restoration Law.

The interactive part was preceded by a short presentation that introduced the case study and provided participants with the necessary background to engage meaningfully in the discussions. After the introductory part, participants took on the roles of different stakeholders related to the specific case, each representing distinct interests. Based on their role, they were assigned to stakeholder groups to develop a proposed solution collaboratively. To support their work, stakeholder groups were offered a set of tools, including the option to i) elect a facilitator; ii) appoint a spokesperson; and iii) consult with other stakeholder groups. In the plenary session, each group presented their solution. This was followed by a joint effort to reach a common solution across all groups. When the discussion reached a final solution or a stalemate, the researchers ended the role-playing part. Afterwards, they introduced the BioAgora project and explained in more detail that the aim of the session was to gather expert input for shaping the Science Service for Biodiversity. The workshop concluded with a reflection round, where participants provided feedback on the discussion tools, their impressions about the final policy solution, other possible tools and processes that could support collaborative decision-making, as well as recommendations for the SSBD based on their experiences and insights. All questions were intended to guide the future structure of the Science Service.

Figure 3*:* Design thinking workshop at the 10th International Degrowth Conference and the 15th Conference of the European Society for Ecological Economics (ESEE) on June 21, 2024 in Pontevedra, Spain.

Before conducting the workshops at conferences, there was a test run in Budapest with 10 participants, coming from a social science and ecology background. Based on the feedback, the workshop structure was refined and further developed. Although the researchers did not conduct a formal assessment of participants' professional backgrounds at the conferences, they used an energiser exercise at the beginning of each workshop to learn about their professional experience. This allowed them to allocate participants to stakeholder roles in a way that drew on their expertise, leading to more informed reflections and more reliable outcomes. The participants represented a geographically diverse group, with most coming from across Europe, and a few from the United States and Southeast Asia.

To ensure a comfortable and open atmosphere during the workshop, the researchers deliberately chose not to make any audio recordings, as they wanted to avoid creating an intimidating environment and encourage participants to speak freely. Instead, each session was supported by both a facilitator and a dedicated note-taker. While the facilitator focused on guiding the discussion and ensuring the smooth flow of the workshop, the note-taker captured detailed written notes to accurately reflect the content and key points raised by participants, including their feedback on the discussion tools and their recommendations for the SSBD.

Table 4: Interactive workshops with the researcher community

				
Name of the conference	European Congress of Conservation Biology "Biodiversity crisis in a changing world" (ECCB)	Sustainability Research and Innovation (SRI) Congress 2024	The 10th International Degrowth Conference and the 15th Conference of the European Society for Ecological Economics (ESEE)	14th European Conference on Ecological Restoration of the Society for Ecological Restoration (SERE)
Date	25 August 2022	13 June 2024	21 June 2024	25 August 2024
Location	Czech University of Life Sciences, Prague, Czech Republic	University of Helsinki, Helsinki, Finland	University of Vigo, Pontevedra, Spain	University of Tartu, Tartu, Estonia
Expected audience	Conservation scientists	Experts, industry and innovators	Social scientists, possibly NGOs	Mostly natural scientists
Length	1.5 hours	2 hours	1.5 hours	2 hours
Nr of participants	~50 participants	7 participants	5 participants	8 participants
Age group	Balanced in age	Balanced in age	Balanced in age	Younger audience

3.3. Methodological limitations

There were a couple of limitations associated with the research methodology. Firstly, it proved difficult to reach relevant interviewees, which may have affected the diversity and representativeness of the insights gathered. In 4 cases, interviewees did not consent to audio recording, resulting in a partial loss of data.

The workshops, while providing valuable insights, were not fully representative due to the relatively small and self-selected sample of participants. Moreover, only written notes from these sessions were available for analysis, which limited the depth and richness of the data.

The qualitative analysis was carried out by multiple researchers, which highlighted the importance of addressing intercoder reliability throughout the process. Although efforts were made to align coding approaches, some inconsistencies may remain.

Finally, the co-creation process itself always presents challenges. These include overlapping tasks, time constraints, and varying mindsets and expectations among researchers, which may hinder smooth collaboration.

4. Results of the interview analysis

4.1. Key actors and their expectations towards the Science Service

4.1.1. Engagement of key actors and potential collaborators

The first part of the interviews focused on key actors, their relationship to EU biodiversity policy-making, as well as their existing networks and missing connections. Interviewed organisations could be grouped into three main types: a) organisations which encourage sustainable land and sea use through incentives and legal rules, and thus take part in policy formulation and implementation; b) organisations which provide data, knowledge, information and targeted policy support, and c) organisations which bridges across these two types of actors, and enables knowledge co-creation. The interviewed organisations are well-embedded in the science-policy landscape and have strong connection to other organisations and networks. These connections can take various forms, such as collaboration on a certain policy issue, cooperation for data sharing, system integration and policy support, working together on cross-sectoral policy implementation, and knowledge transfer and co-creation. Despite their wide networks, most of the interviewed organisations also identified weaknesses or missing connections, which could represent either a disconnection from practice, or a lack of cross-sectoral collaboration, or a lack of access, understanding and uptake of evidence-based information. Here we do not go into more details of what each of the interviewed organisations do or how strongly they connect to other organisations in the field (see BioAgora Deliverable D2.1 for a network analysis), but will pay more attention to best practices to keep relevant actors engaged in science-policy-society interactions.

The interviewed participants outlined different aspects of engagement actions and pathways they had adopted, used, or been a part of. Most of the observations contain also the evaluation of the engagement actions. The observations pertain different types of engagement, in terms of actor type, type of engagement and degree of formality / institutionalisation of the engagement action, as well as type of

approach, and stage of request process when the engagement action takes place. The different types of engagement insights can be loosely categorised as follows:

- Institutional - regarding engagement of and interaction with platforms, networks, and advisory boards;
- Procedural insights - e.g., co-defining CAP plans, early request scoping practices;
- Individual-driven (notable personal impact);
- Community-based (engagement of indigenous and local groups);
- Strategic (aligned with EU frameworks and instruments).

A common observation in all codes is the one where the most efficient tool for engagement is the tailored engagement approach taking into account the incentives of the relevant stakeholder in question, while remaining flexible to context and institutional evolution. The analysis outlines some commonly used engagement pathways and approaches, as well as some exceptional ones, some of which are stated to be quite successful. The recurring engagement pathways outlined are as follows:

- Formal engagement pathways – organisation of workshops on particular topics, especially when it comes to a request-handling process; engagement of actors at EC events, DG consultations, policy-aligned advisory boards, formal dialogue organised by the institutions of the EU, participation at the EUBP;
- Informal engagement pathways - trust-building exchanges, informal feedback loops with policymakers;
- Co-creative engagement pathways – establishing practices of collaborative problem definition (pre-submission dialogue) and collaborative problem-solving; joint request scoping process (a particular code noted that this process is extremely important for improving request formulation efficiency as policymakers could be consulted by scientists on the availability of knowledge on a certain topic in advance);
- Capacity-building oriented - summer schools, technical trainings, short courses.

A recommendation drawn based on the analysis is that the most efficient approach may be to create and maintain a hybrid model combining formal institutional pathways with community-led and informal channels to optimise both reach and depth of engagement.

Furthermore, the analysis provides a variety of observations of particular engagement and communication activities, with an evaluation of the effectiveness of these activities towards particular stakeholders. Among the most commonly used engagement activities are:

- organisation or attendance of conferences and summer schools;
- organisation of and participation in workshops, stakeholder mapping meetings, bilateral exchanges;
- attending and presenting at project welcome meetings and policy roundtables;
- organisation of joint briefings, joint reports and joint presentation of the results.

A notable engagement activity, outlined by one of the interviewed people as not typical of SPSI actors but very effective, was organising of a hackathon. A general recommendation drawn from the analysis is that it is necessary to prioritise recurring, interactive formats such as workshops and conferences that can evolve into co-creative platforms over time. Ensuring inclusivity and accessibility in event formats is also outlined as essential, with good communication of the initiatives ensuring that where appropriate, the

landscape of actors should be enlarged. The most common way of engagement was undisputedly the conference, followed by workshops. While all the interviewed people admit that this is the standard and well-proven engagement activity, most of the interviewed people also admit that there is a fatigue from such events, and their efficiency is actually in decline. One interviewed person shared their experience with engaging with a business organisation that supported engagement through the organisation of the hackathon, thus leading to the impression in the interviewed person that private business has more agile strategies for engagement which can be explored further by SPSI actors.

Engagement tools are the operational mechanisms that translate engagement strategies into actionable practices. As most effective engagement tools, the following types of tools were outlined by the interviewees:

- Policy briefs and white papers;
- Reports;
- Infographics, success stories, visual storytelling;
- FAIR guidelines, request submission procedural dialogue;
- Snappy summaries and concise messaging.

The production and presentation of reports and other policy-related documents, such as policy briefs, factsheets, etc. is also outlined as a traditional and effective way of engaging actors. In terms of engaging policymakers, a couple of interviewed people explicitly outline that short materials with key insights is the way to efficiently engage them, as policymakers: a. don't have the time to read lengthy reports, and b. they need catchy messages which they can easily use in policy dialogue and political conversation (negotiation). Furthermore, the engagement of different actors at different societal levels calls for different approaches and formulation of the messages in accordance with what may be useful to the particular stakeholder.

A specific recommendation which can be drawn from the codes in this direction is therefore to design toolkits that accommodate both policymakers' time constraints and stakeholders' need for clarity and recognition. An encouragement of the use of visual, succinct tools that enhance engagement likelihood, is also present in some codes. Criticism towards lengthy reports is expressed by some of the interviewed people.

4.1.2. Expectations towards the Science Service

The "expectations" section of the interviews carried out in BioAgora under Task 4.1 comprised six codes: Targeted activities; Target groups; Added Value; Potential areas of collaboration; No Go Lines and Transformation. The codes are discussed in more detail below.

4.1.2.1. Targeted activities

A number of targeted activities that could be undertaken by the SSBD were identified by interviewees. The first and most mentioned was a **centralised platform of existing research tailored to stakeholders**. One interviewee wanted a platform that could provide "*one reference source on certain topics*" bearing in mind that "*there's definitely plenty of reports providing policy recommendations*. […] *Have it centralised would be useful, I guess*" and that "*there's no Wikipedia on biodiversity for policy officers and farmers to my knowledge at least*" (Bioagora_T41_n13).

Such a centralised hub would be useful for a range of different actors (already mentioned in section 3) and would make the use of targeting information easier at multiple levels. Taking the example of Member States, one interviewee described it as a "*centralised hub of information that we could pull out information from when we receive requests from member states, for instance, or just in a more systematic manner […] the idea would be to have something which can be of use in different cases, and then managing authorities can find what is relevant for them there*" Bioagora_t41_no16.

Such a platform would be publicly available with a need for "*the accessibility of that information, having it either published online so publicly available, or somehow have it for internal use, but then to be able to use it when needed*" (BioAgora_T41_no7).

The information of course would need not only to be centralised and accessible, but also structured in a way that would make its use more relevant and impactful: "*that's a bit the missing link between all the projects, the information they collect and having a process for gathering them, making them available, reprocess them, add value and eventually reach the policy and have a significant impact*" (BioAgora_T41_no7). As such, interviewees suggested that target actions of the SSBD could be to develop "*very summarised and tailor-made relevant information for our role*" and for the SSBD to "*extract and reformulate the key, the core facts in ways which work for policymaking and which you can almost copy-paste*" (BioAgora_t41_no11).

The platform could also be used as a repository to share information, for example "*case studies around the globe*" (Bioagora_t41_no12) or sharing "*info sheets or database on questions that were submitted by others and responded by the SSBD would be useful to share. In the case of DG Regio, often one MS asks a question which has relevance to other MS as well*" (Bioagora_t41_no16).

More than a centralised platform, interviewees suggested that targeted activities should include **direct consultations with experts**: "*You're providing the DGs with kind of a human interaction. So rather than just giving them a database and saying here's all the scientific outputs, the answers are in there, but you've got to find them. You're putting them in touch with a human who can do some of that work for them and who understands and knows which of those resources are going to be most relevant*" Bioagora_t41_pilot2. The emphasis was made here on the need for dialogue, with scientists listening to the needs of policy-makers: "*I think just listening to stakeholders would be, if we did more of that, I think that would be super useful. And again, that's what the science service is kind of doing where we have inquiries that come in. We'll be having meetings with those people who've put the inquiries in. The first step in that process will be to really understand what the question is, how we want to answer it. And again, I think that's the right way to do it. Less presenting and more listening, I think, is what we should be doing as a sector*" (Bioagora_t41_pilot2).

Beyond the policy sector, such an engagement also needed **targeted activities towards others in the SPSI** (civil society, etc.) with a more systematic approach to gathering key actors around a specific policy issue: "*it's more ad hoc, on a certain topic then you have roundtables or workshops that you invite the relevant stakeholders, different projects from different funding programs. But given the complexity and the number of ongoing initiatives it's really complex to gather everyone around in a systematic way. I've never seen such institutionalised approach*" (BioAgora_T41_no7).

A specific activity that was raised by interviewees was the **pro-active identification of research priorities that could be used in policy-making**: "*We need something proactive to bring a scientific message or needs towards the European Commission. That needs very specific skills, individual skills, perhaps, to reach that*" (Bioagora_T41_no1_pilot). The same interviewee mentioned the revival of the European Platform for Biodiversity Research Strategy that *"brought science and policy together to develop priorities as they thought together rather than scientists getting together in a room and then telling policy what they*

thought or vice versa". Such an activity was seen as complementary to other research prioritisation processes, e.g. Biodiversa+: "*One thing that I thought BioAgora should be doing should be to be looking at research priorities. Biodiversa needs to do it for their own purpose, and BioAgora would do well to work with Biodiversa. But I think to restrict you and to stop you from looking at future research needs would be crazy*" (Bioagora_T41_no9).

Another specific activity that was seen as potentially important for the SSBD was **bringing biodiversity centre stage**: "*If you could have a common narrative of people talking about the importance and value of biodiversity and they can use different language about flood risk prevention, blah, blah, blah. That would be fantastic and that knowledge service out there and maybe using a different language to come in to spread the message that we as scientists are very poor at spreading, that would be really good*" (BioAgora_T41_no6). This was seen as an activity that could directly support the work of the DGs: "*they have a lot of people working in the DGs who are really good and really smart. But having additional knowledge products helps them sell. And then if they're written in ways that there are accounts that the commissioners or their cabinet can get them as well, then that's fantastic*" (BioAgora_T41_no6).

Other targeted activities were mentioned, but by only single interviewees. These included **capacity-building and urgent requests**. One interviewee mentioned the potential for BioAgora to provide capacity-building at later career stages, and across science and policy: "*there's an opportunity I think, and a different niche for Bio-Agora to address those in mid or later careers to continue to learn and also to bring those two groups, if you call those two groups together, researchers trying to make a difference with policymakers also trying to make a difference. So, I think that's a niche.* (Bioagora_T41_no1_pilot). Only one interviewee explicitly mentioned urgent requests: "*Now you are in the business of trying to respond very quickly to very precise policy requests. And to find indeed if research in science is able to sort of through a reformulation of key findings, etc., a kind of quick response. […] So, the reflection should be more around, not what do we have in our cupboard to answer any questions, but more, let's review very precisely the policy questions coming to us*" (BioAgora_T41_no6).

4.1.2.2. Target groups

The SSBD target group most often mentioned by interviewees were **policy actors**. These included **politicians and decision-makers**: "*the primary target audience, I think it still makes sense for those to be decision-makers*" (BioAgora_T41_no10final); but also, **policy officers both in the European Commission and national ministries**.

For the European Commission, one policy officer said: "*I think as a policy officer or research program officer or actor involved in any institution would probably be very useful if I could just go on this platform, type in what I'm concerned about, exchange with someone, an expert, would then relatively rapidly provide a tailor-made report about what are the main challenges, what are the barriers. I mean, that would be the, I mean, very, very useful for sure*" (Bioagora_T41_n13). The interaction would not only be with the European Commission however, with one interviewee noting the current lack of contact with the policy officers at national ministry levels "*those who draft the policies or form their opinions on EU policies*" (BioAgora_T41_no6). This target group did not only focus on biodiversity policy but included "*the policy developers for government policy. Because if we talk to the biodiversity community, that's great. But when you're developing a national policy, it's not the strongest voice around the table. It'll be the education or the employment or the industry or agriculture or whatever*" (BioAgora_T41_no6). The role for mainstreaming biodiversity was a clear mandate here for the future SSBD.

Interviewees mentioned **the broader civil society**, with a need to have "*the citizens on board, the interested parties on board* […] *people are creative, they do care, we need to be able to take them on board*" (BioAgora_T41_no10final). The **farming and business community** was also highlighted "*I think the business community is a big one. They can be the cause of a lot of destruction, but they can be the solution as well, especially agricultural sector. And I think that they can be often demonised. So, agriculture, for example, is both the problem and the solution in Europe*" (BioAgora_T41_no6).

4.1.2.3. Added value

The potential added value of the future SSBD was recognised by interviewees and spanned a number of different areas, detailed below.

The most frequently mentioned added value was the value of having **recommendations based on existing research and tailored to stakeholders**. This added value was seen as needed due to the perception that while "*there's plenty of very valuable and very useful information. It's just not always very visible*" (Bioagora_T41_n13). The idea was therefore to bring "*more visibility on some relevant information instead of creating new information, at least to explore the relevant information*" (Bioagora_T41_n13). Going a step further, this process was seen then as essential in terms of providing stakeholders with the relevant information. One interviewee described this as "*in an ideal world, it would be amazing to have a very summarised, tailor-made recommendation for all stakeholders*" Bioagora_T41_n13. Importantly this did not involve a dilution of the complexity "*But here comes the thing. Not dumbed down the complexity, but simplify it in a way that it becomes politically relevant*" (Bioagora_T41_no9)

An added value of this process of summarising and adapting science for policy was the potential for **direct exchanges with experts**, so "not just to have a written report, but there may be direct consultation with specific experts. You could check kind of or like more this panel discussion or direct discussions with experts" (Bioagora_T41_n13).

The **identification of gaps in research and research prioritisation** was mentioned by interviewees as well as the pickup of those research prioritisations by policy: "*Scientists can do a very good horizon scanning and have got all strong opinions on what is needed and what should be financed, etc. But the trick is, and that's an issue to bring it to policy-making and make it accepted as being indeed the relevant steps forward with science underpinning biodiversity strategies or biodiversity policy-making*" (Bioagora_T41_no1_pilot).

Other added values included the **inclusion of broader stakeholders in the science-policy-society interface**, namely holders of local and indigenous knowledge, the **monitoring and assessing of impact of projects on biodiversity**, having a **one-stop shop** with "subgroups having expertise on specific areas where we could refer to" (Bioagora_T41_n13), and being able to **strengthen the message on biodiversity**: "using a different language to come in to spread the message that we as scientists are very poor at spreading, that would be really good" (BioAgora_T41_no6).

The added value of the SSBD was perceived in turn as potentially adding to the recognition of those working at the SPSI: "*So I think if we really succeed to bring the added value of the science service and bringing the added value of participating in the science service. Maybe, it's maybe naive, but maybe we are evolving the mentality more and more and bring normality towards the involvement of people, involvement at least of researchers in the interface*" (Bioagora_T41_no9).

4.1.2.4 Potential areas of collaboration

In terms of groups with which to collaborate in the SSBD, interviewees mentioned **policy-makers, experts, civil society, Member States, as well as institutions, networks and projects.**

Policy-makers were mentioned most by interviewees, in terms of their roles as potential requesters of research outputs and outcomes, but also in terms of their potential uptake of research: "*We need action. We need uptake, right? So that's something which for us will be extremely, extremely beneficiary, I think, to the overall science policy actors' community*" (BioAgora_T41_no6).

Collaboration with experts was also a key need from the policy-side, with one interviewee noting: "*wouldn't it be nice to speak to a topic expert who can just give you a few links and point you in the right direction so that you know those first steps you take are going in the right direction*" (Bioagora_t41_pilot2).

Working with Member States was mentioned, with the caveat that "*Member states are very reluctant to open the database and to exchange about data*" (Bioagora_T41_n13). Civil society was also mentioned, including NGOs but this was not necessarily seen as being a direct collaboration, with an interviewee suggesting working more closely with "*organisations that are better at reaching out to citizens and should be able to take the results of your work and do that as well*" (BioAgora_T41_no10final).

Other interviewees highlighted the need to work with other networks including LIFE projects, OPPLA and Network Nature.

4.1.2.4. No Go Lines

According to the interviewees, five "no go lines" were identified in terms of the future Science Service for Biodiversity (SSBD). The first was the need to **avoid being restricted to being a service to policy**, with one interviewee highlighting the risks of such an approach "*there are all sorts of dangers around that in terms of from the science community saying, who are they to talk for science, and also they're seeing them simply as a service*" (Bioagora_T41_no1_pilot). The second was the need to **work jointly with policymakers**. The third was to **avoid competing with others within the Science-Policy Interface** landscape: "*you would need to find a way of engaging in a positive dynamic with the existing alpha males in the area*. […] *We have so many biodiversity knowledge initiatives now*. […] *And most of them are ending up in a niche at some stage* (BioAgora_T41_no11). The fourth "no go line" was the **risk of appropriation**, with an interviewee warning that "*quite often actually science services try to tease our brains first and try to extract stuff from us. And then they summarise it and sell it to us*." (BioAgora_T41_no11). The last "no go line" was the need for the future SSBD to **go beyond biodiversity**, "*coordinating not only with the biodiversity knowledge people*" and not setting up a "*completely different and parallel process set up for biodiversity*" (BioAgora_T41_no7).

4.1.2.5. Transformation

The most important potential transformation arising from the SSBD was perceived by interviewees as **bridging of the gap between science, policy and practice**, with one interviewee summarising this as follows: "*I think actually we inspired by the Green Deal, we have brought the minds together a lot. There's a lot of convergence in policy in the sense that the policy is written on a piece of paper. But how do we get from there to implementation? And of course, science also has to provide an input here. But I think the biggest gap is always on putting things into practice*" (BioAgora_T41_no11). Another interviewee, in the same way, mentioned the need to link policy, science and practice more effectively: "*The main question*

remains, how can authorities at different levels of governance successfully invest in nature and biodiversity and what guidance is available and what not and what can be better. I think that sort of a synthesis is what cohesion policy needs" (Bioagora_t41_no16). This involved more interactions, and a potentially different approach to how policy and other stakeholders were perceived by the scientists: "*when you bring stakeholders into the mix, again, you're creating more opportunities for things to change. But we have to bring the stakeholders in. We can't work in a vacuum and the policy community are stakeholders. So, it's changing how we work as a sector. And let's be more responsive, let's treat our stakeholders more like clients in a business than just like a tokenistic goal"* (Bioagora_t41_pilot2).

The SSBD could potentially contribute to a transformation in the way **scientific input can be used in policy and decision-making and recognition of work at the SPSI**. The first challenge was seen as improving the communication with policy, for example by better communicating challenges "*policy-makers have to understand that they're no easy fixes and 'give me an answer' because of all the trade-offs that are always part of the picture*" (Bioagora_t41_no5_notes). It also requires time: "*need patience for good processes so that results are accessible to everyone*" (Bioagora_t41_no5_notes), and genuine transdisciplinarity: "*Transdisciplinarity is still niche in science, need to increase awareness, value and acceptance of such processes*" (Bioagora_t41_no5_notes). The second challenge was to better recognise those actors working at the SPSI. A potential transformative aspect of the SSBD was therefore "*identifying and creating opportunities for specific experts within different networks to contribute to policy decisions and policy-making*" (Bioagora_t41_no5_notes), but also in its "*acknowledgement of researchers or any people participating in the science service and that there is a true acknowledgment and that there is some kind of informing or participating to the education of institutions or organisation towards the need of being more at the interface*" (Bioagora_T41_no9). More than this, such a transformation needed a greater value put to science and its potential contributions: "*we've seen recently with the nature restoration law for example where it was the scientific facts that were questioned again during the political decision-making process. You know, we, we really have this post-truth and almost Trumpian politics situation where suddenly the opinion of the experts was not relevant, was almost seen as a bad thing and then suddenly it was the electoral priorities that have been dominating the debate and there was so much disinformation that was spread to serve those political purposes, that, yes, so I, so we definitely see the value of science and we really need to make sure that science is really taken on board in decision-making processes much, much more that what we've said we've seen recently*." (BioAgora_T41_no10final).

According to one interviewee, such transformations needed a **rethink of the way in which research was carried out**. This needed a rethink in terms of being able to change the direction of a research project based on feedback: "*we need science to be experimental and we need to be able to just do science for the sake of science, but we need to get better at being prepared to change and rethink things halfway through. Or even if it's inconvenient and it's going to make things, we have to change the grant agreement or we have to accept that some of the work we've done hasn't been very useful. […] it's all about having those little iterative processes built into your long linear process so that you can identify those failures more quickly and you can make adjustments more quickly*" (Bioagora_t41_pilot2).

Such a change in the way things were done also required a change in our interactions with other stakeholder through real co-production of knowledge: "*I've yet to see a project that does real co-production. We still just go out to stakeholders. We have a webinar or a workshop. We say thank you for your input, and then we all go back into our silos, and we just produce outputs. And I've even, some projects I get the feeling they're almost reluctant to work with stakeholders because they just want to do the science in our own way. Because real co-production requires a willingness to listen to stakeholders and allow their voice to actually change what you're doing. If you do real co-production, stakeholders have to be there to make decisions with you. And that decision might be, actually no, your idea sucks. I don't want to use that*

output you're creating. It's completely wrong. I need something else. And in a horizon project, that's quite difficult because you then have to go on, what are we going to do? We're going to have to completely rethink this work package. And that causes difficulties. But if we want to do real co-production, if we want to be genuinely agile and meet these policy needs that are changing quite frequently, and meet business needs, that's what we have to do. So, we had to sort of embrace that flexibility and perhaps plan shorter term" (Bioagora_t41_pilot2).

4.2. Key issues to consider when setting up the governance structure

In this section, we analyse the governance structure of other SPSIs which BioAgora can use as a role model (section 4.2.1), and those institutionalised opportunities which have been created by policy actors to connect to knowledge holders outside of policy (section 4.2.2).

4.2.1. Governance structures

This code refers to the governing bodies of the interviewed organisations which make and implement decisions, as well as the relationships between these bodies. These could include e.g. the board of directors, the board of advisors, specific task forces, working groups, or units with specific tasks. During the analysis, we paid attention to the qualitative aspects of governance (i.e. path-dependence, centralisation of power, hierarchies, bureaucracy).

4.2.1.1. Internal governance of science-policy interface actors

a. Decision-making bodies

Those science-policy interfaces which we analysed in this report set up different bodies and divide tasks associated with decision-making and implementation (see illustrative figures for the governance structure of the analysed organisations in the Annex).

Decision-making bodies are responsible for longer term, strategic decisions, as well as decisions that provide the frame for the day-to-day management (e.g. budget, future directions and priorities, appointing key personnel etc). In most organisations, different decision-making bodies operate with shared responsibilities. This dual structure is especially relevant for membership-based organisations, as the following examples show:

- In IPBES, the Plenary (consisting of the representatives of all member states) takes the main decisions regarding future directions and outputs (i.e. approving the work plan, accepting scoping and assessment reports etc), while the Bureau and the Multidisciplinary Expert Panel oversees the operational decisions (i.e., appointing chairs of assessments).
- In Future Earth, the Governing Council makes the decisions, but the Assembly (including regional and national contact points) provides advice and information based on which the Council decides.
- In Biodiversa+, the Chairs team take responsibility for major operative decisions and coordinates all the actions of the organisation according to the shared vision, but the General Assembly (incl.

representatives of each member) decides on the long-term priorities. The importance of strong leadership (a chair, chair team, and CEO) to embody the strategic vision of Biodiversa+ and represent the organisation on external events was also emphasised.

- Even in organisations where there are no 'members' per se, the main decision-making body is supported by a group of strategic advisors which usually involve actors from the policy side. For instance, in Eklipse, the Knowledge Coordination Body operates independently from the day-to-day management to ensure that requests' intake is decided in a value-based manner, not tainted by organisational interest. Furthermore, KCBD is supported by the Strategic Advisory Board to ensure policy relevance.
-

Members of the decision-making bodies usually work on an unpaid basis, considering their work time as membership contribution (but associated costs, e.g. traveling to meetings can be covered by the organisation). The combination of a narrower and more operative (i.e. Board) and a broader and more strategic decision-making body including members who are often also the knowledge users (i.e. Assembly) help to ensure the policy relevance of the activities carried out and the outputs generated by the given organisation.

b. Management bodies

Day-to-day operations, including general coordination, finances, communication and publicity, human resources, and often networking, are usually managed by a secretariat or an operational team. Depending on the complexity of the organisation, the size of the secretariat might range from 1-2 paid employees, and some volunteers to 10+ paid employees and/or hired external service providers. Costs associated with day-to-day operation are covered either by the income generated or through membership contributions and donations.

The analysed organisation varies greatly depending on the scope and size of the organisation. Big international organisations (e.g., Future Earth, ICES) typically have, beside their central management body, smaller units which carry out regionally or thematically specified activities as the following examples show.

- In Future Earth and UNEP, there are regional offices which are responsible for coordinating and boosting activities in the different regions.
- In ICES, there are thematic working groups, which are also divided regionally, each eco-regions having their own working group in all (or many) of the themes. These subgroups work in cooperation on policy advice, which is then processed by an advice drafting group and finalised and published by a central Advice Committee.
- In IPBES, task forces and technical support units are set up to carry out activities related to the main functions (e.g. knowledge and data, indigenous and local knowledge, capacity building etc.). These units are hosted (their operational costs are covered) by different IPBES member countries.
- In Biodiversa+, the operational team is responsible for the overall implementation, but their work is supported by the executive board and the steering committee. Biodiversa+ also takes upon the task of creating policy briefs based on scientific evidence generated under their projects; however, this is more of an extra "service" to both (science as well as policy) sides rather than the manifestation of a hierarchy.

Smaller organisations usually operate flatter and more decentralised structures. For instance, Eklipse handles most of the day-to-day management centrally by its management body, but still has support units, such as the Method Expert Group, which offer targeted support to the expert groups. EEB, on the other hand, forms working groups on a voluntary basis and applies some coordination between these. Their member organisations feed member state level information upwards, and EEB also provides resources to enable member organisations to support member state level implementation of EU-level legislation.

c. Advisory bodies

SPSI organisations typically have a high-profile advisory body (e.g., advisory group (Alternet), strategic advisory board (Eklipse), advisory board (Biodiversa+)), typically consisting of a diverse set of stakeholders, covering the academic field, decision-makers, SPSI-related people, as well as NGOs and other societal actors. This provides a wide network to support the work of the organisation and ensures credibility. It is emphasised that maintaining a vivid relationship with these bodies is of utter importance. In the case of Eklipse, the strategic advisory board selects the members of the Knowledge Coordination Body (KCB), while KCB as an independent body decides about which requests to take, which requests to process, based on a set of criteria (e.g., relevancy to the European scale, policy relevance, avoidance of knowledge duplication). In the case of Biodiversa+, members of the advisory board come from a broader stakeholder board with many people and organisations involved.

d. Expert groups

Experts are crucial in knowledge synthesis, but also in other regular activities of a science-policy interface (e.g. data curation, horizon scanning). One way of organising knowledge synthesis/overview is through collaborating with independent research centres or other scientific bodies in an irregular, case-based manner, while the other is to utilise expertise inside of the organisation – with many shades between these two extremities:

- collaborating with independent research centres on a regular basis, based on bilateral agreements (e.g. UNEP)
- building collaboration in a "hub"-format with different core academic/scientific entities (e.g. International Science Council), who have their own network to bring in (UNEP)
- forming topical academic working groups (EEA)
- establishing semi-permanent, topical working groups like Expert Working Groups (Eklipse) or Assessment teams and Task forces (IPBES)
- directly feeding in outcomes of specifically designed research projects like the Living Lab and the Lighthouses concept, to channel best practices (DG Agri)

Easy access to available knowledge and information, and connections to relevant knowledge holders can speed up and improve the process of knowledge synthesis and co-production. This form of knowledge management can be enhanced by creating catalogues or databases of research projects (CINEA/LIFE, Biodiversa+). Similarly, tools to motivate researchers and organisations to participate in SPSI activities and to ensure the impact of scientific research on policy, Biodiversa+ mentions developing success stories that demonstrate that scientific impact can make a change in policy-making.

An important point in terms of organisational solutions of knowledge synthesis and co-production is reimbursement. Eklipse, Alternet, IPBES, ICES and UNEP encounter that experts are deliberately not paid

directly (although associated costs such as travel can be reimbursed); however, it creates significant motivational and accountability challenges.

4.2.1.2. Organisational solutions to connect with the policy-making field

Organising science-policy connections is complicated by the fact that in case of different (environmental) scopes, different levels of policy-making actors have to be addressed and involved, and planning, policy-making, implementation, etc. may require the involvement of further actors; also, it remains a question whether the focus should be on the EU-level or also on member states. SPSI actors perceive the whole scene complicated, and they feel it would be necessary to deeply understand and map it to enhance science-policy collaboration.

The most widespread organisational form of connecting to policy-making is the organisation of all kinds of networking events, creating meeting platforms, science-policy forums, and so on; and also participating at networking events organised by other, mainly decision formulating bodies, DGs. As formal frameworks, Policy and Legislative Priorities (PLP) are mentioned as useful instruments in identifying and targeting true policy focus areas and fitting projects. However, as it is also mentioned, keeping up this connection is not easy and requires a delicate balance between formal and informal structures. Formal structures (platform meetings, publications on different themes) have the advantage that they may ensure or enforce regularity and transparency, but it also may hinder the flexibility of informal relationships, which also have their very positive side. It was even raised by one of the interviewed organisations whether they as an SPSI has a "mandate" for anything else than just creating these platforms to ensure that individual people can access and contribute to policy-making, expressing that they should speak for their partners, and not to have their own voice.

DGs have different perceptions about how – on structural levels – policy formulation and intersectoral cooperation is happening. Some encounter well-working processes, while others face an overwhelming amount of work, due to the wide variety of topics and tasks that have to be covered. The EC-initiated process to "break down silos", to have different sectors work together in a co-creative manner, is mentioned as a requirement towards the DGs, although there seem to be no clear-cut structures and processes to support this. The preliminary, internal consultation process inside of the DG seems even more vague, uncertain and under-defined, with perceptions of usefulness and feasibility differing from DG to DG.

4.2.2. Governance processes

The governance processes code refers to the internal processes of the interviewed organisations, either formalised or spontaneous, that support decision-making and implementation. These include internal communication, task division and management, as well as processes to make strategic decisions or to select the leaders of the organisation. During the analysis we paid special attention to the different functions integrated into the interviewed organisations and how these functions are carried out. While a detailed description of internal governance (e.g. decisions are made in a top-down or rather bottom-up style, etc.) would have been useful for designing the governance framework of the SSBD, the interviews usually stayed at a more general level (however, scientific papers on some existing SPSIs (such as IPBES or IPCC) can shed light on some of these procedural aspects).

4.2.2.1. Identifying knowledge needs: anticipating and scoping

Several interviews highlighted the importance of identifying research gaps and knowledge needs as a preliminary step to provide policy relevant knowledge, as already mentioned among expectations towards the SSBD in section 4.1.2. Different approaches are used to this end. For instance, Eklipse, Biodiversa+, and Future Earth offer a horizon scanning function which identifies knowledge gaps and helps priority setting. Others work in close collaboration with their advisory bodies or members, or key knowledge users to co-create annual or biannual roadmaps. This is often done in the frame of yearly meetings with the aim of reflecting policy priorities in the work plan of a given SPSI actor. Mutual dialogue has a critical role in setting up such roadmaps to humanise the process and avoid false urgency.

Fewer organisations reported that they also engage in an iterative dialogue with the requester (the actor who asks for a specific knowledge overview / synthesis / co-production process to fill a knowledge gap) to better understand the exact need and to tailor the knowledge brokerage process to this need before it starts. This iterative dialogue and refining of the research question is called scoping by Eklipse, and it proved to be efficient enhancing the policy relevance of the outputs. Scoping is also crucial to make the knowledge brokerage process more agile. Scoping can also contribute to a more balanced knowledge co-production process if it is driven by the expert community.

4.2.2.2. Knowledge brokerage

We could identify different patterns of knowledge brokerage (i.e., processes ranging from overviewing and synthesising to co-producing knowledge to support policy-making) at different interviewed organisations. SPSI actors emphasised the importance of anticipating knowledge needs and running knowledge brokerage processes according to predefined roadmaps / work plans to make resource planning possible and to ensure high scientific quality. Knowledge users, on the other hand, highlighted that timeliness and responsiveness in the knowledge brokerage process is the most important, therefore many of them considered a knowledge brokerage upon request model to be more effective. Urgency was discussed in several interviews as an inherent characteristic of many policy processes, but at the same time also as a false assumption which can be managed if knowledge needs are known before and if the knowledge brokerage process is iterative (based on co-production instead of linear knowledge translation). To resolve these opposing views, several suggestions were made:

- Focus more on the anticipation / scoping phase and create more collaborative approaches for knowledge brokerage (i.e. policy lab type of engagement where a policy problem is at the centre, and the solution is co-produced by the knowledge user, the researchers, and other knowledge holders including practitioners or NGOs)
- Use creative and interactive methods for short term knowledge brokerage processes instead of the regular knowledge synthesis / consultation methods. Examples mentioned include hackathons or intensive workshops where the experts work on the policy problem for one week (or similar) to come up with a solution by the end.
- Offer combined outputs: besides a regular report, provide opportunities for the knowledge user and the wider target group to learn more about the process and background of the results through an open consultation. Such a consultation can increase the policy impact as well.

Processes related to the involvement of diverse knowledge forms are explained further in the next section (section 4.2.3).

4.2.2.3. Engaging diverse actors and enhancing their capacities

Engagement of different actors (knowledge holders and stakeholders) were mentioned by several interviewees as important in SPSI activities, as was already pointed out earlier. However, several challenges were also highlighted, such as the potential emergence of interest conflicts if different stakeholders are engaged in SPSI processes, or the cultural difficulties or lack of resources to engage underrepresented or vulnerable groups in SPSI activities. Prior to designing engagement activities, relevant actors have to be mapped, and their needs should be assessed, to understand what they can gain from getting engaged.

Engagement can extend to different types of actors:

- If like-minded organisations are in the focus, the result is a horizontal partnership among various existing initiatives, which can lead to better work division and synergies (this was mentioned frequently as an important expectation towards the science service). When creating partnerships, two main aspects should be considered: first, ad hoc collaborations were reported to be very demanding therefore strategic partnerships should be in the focus; second, key partners should be identified not just horizontally but also vertically to improve policy uptake and implementation.
- If stakeholders are in the focus of SPSI engagement activities, we can conceptualise SPSIs as science-policy-practice interfaces (this was often mentioned by knowledge users as an effective approach to enhance policy implementation, examples were communities of practice or living labs).
- If citizens are in focus, we can conceptualise SPSIs as science-policy-society interfaces (this was mentioned less frequently by interviewees).

Finally, interviews provided several details on capacity gaps and ideal forms of capacity development - these lessons are integrated in the BioAgora Deliverable D5.1.

4.2.2.4. Monitoring policy implementation

The fourth, although less frequently mentioned SPSI activity was monitoring and policy implementation, which is important to shed light on capacity gaps, implementation failures, and potential future knowledge needs. As one of the interviewed knowledge users explained:

"I think the biggest gap is always in putting things into practice and realising a few... when you put things into practice that just don't work out the way you thought. So, I think that a scientific hand holding and support during policy implementation with all its shortcomings and its problems and learning and redoing things could be useful. That we get also some feedback. (...) Maybe that could be something. I would probably consider that useful. Very useful." (BioAgora_T41_no11)

While monitoring and policy implementation were recommended as a potential function for the SSBD to take, only very few examples were mentioned on how such a function could efficiently work. One such example was the watchdog function some of the NGOs play at the European and national level. The other example focused on assessing the impact generated by the knowledge brokerage process (i.e., impact tracking) through surveys and interviews.

4.2.3. Including diverse knowledges

This code refers to if and how different knowledge holders are engaged in co-creating outcomes. A central question for the SSBD is how to engage different knowledge holders relevant for biodiversity decision-making and how to ensure their participation in the knowledge co-creation process. The importance of this aspect was already demonstrated in previous sections, notably section 4.1.2. Here we describe in more details who the considered knowledge holders are for the interviewed organisations and how their knowledge is harvested (one-way knowledge provision -- mutual exchange -- co-production). In addition, some interviewees also elaborated on the stakeholders that should be (better) engaged in their processes but whose voices are often missing, and on what makes a stakeholder relevant for biodiversity decision-making. Finally, we discuss what the SSBD could do to enhance its co-production capacities and how knowledge outputs could be characterised in the SSBD.

Including diverse knowledge is closely related to aspects that emerged under the codes „**Ensuring relevance**" and „**Reaching policy impact**", both of which concerns the necessary qualities of scientific input ensuring that it will be relevant for and used by policy-makers. Three different factors contributing to policy relevance and impact are discussed in this concern, most of which are cross-cutting with the inclusion of scientific evidence: inclusion of different scientific disciplines, inclusion of different knowledge systems, and intersectoral cooperation – out of which the first two are presented in this section, while intersectoral cooperation is addressed in section 4.2.4.

Interdisciplinarity appears explicitly in some of the interviews; however, a more relevant dimension in this concern is not just involving different disciplines but also different sectors, primarily inside the EU. The necessity of involving a wider array of scientific disciplines to make policies more relevant and more probable to succeed comes up mostly related to social sciences – a niche highly prevalent and well known in many areas "naturally" related to natural sciences in the first place. In spite of the emphasised importance of interdisciplinary inputs, numerous interviews show that this process is far from being complete and thorough.

Including the knowledge and experience of societal actors, relevant stakeholders, and overall non-academic knowledge holders in a **transdisciplinary** manner appears as important in many of the interviews. The main arguments our interview partners used were, as also reflected in the relevant literature, on one hand to reveal the aspect of all interested parties and the member states to achieve as mutually supported recommendations as possible, to make the policy design balanced, fair, acceptable and possible to implement; and on the other hand to get better understanding, more complete information of issues, even related to what are the important issues.

Regarding the form knowledge accumulation takes, scientific conferences, seminars, summer schools, and other professional gatherings are mentioned frequently by interviewees, also mentioned below. The importance of the networking function of such events has to be emphasised: can greatly contribute to informal, personal kind of relationships which then contribute to forming trust and establishing professional cooperations, and eventually to more connected, harmonised, evidence-based policies.

4.2.3.1. Who are considered knowledge holders?

Answers to this question vary substantially according to the institutional background of the interviewee: SPSIs generally have a broader pool of knowledge holders that are engaged than traditional policy organisations such as the DGs. Knowledge holders can be understood both as **a) individual actors** who have scientific and/or practical knowledge (e.g. scientists, indigenous peoples, farmers, or businesses) and

as **b) platforms, knowledge hubs, or organisations** whose collective knowledge (e.g. data, reports, opinion pieces, etc.) is harvested during data gathering, horizon scanning, knowledge synthesis, or in decision-making (e.g. the KCBD, EEA, Belgian biodiversity platform, etc.). These latter organisations and hubs can fulfil important functions in providing summarised and tailor-made information for policy-makers.

Our categorisation of knowledge holders follows results in D3.1. on assessing policy-relevant biodiversity knowledge types. This means that we categorised knowledge holders into the following groups: governmental agencies, scientific bodies, civil society and NGOs, businesses, local communities and citizens.

The most common knowledge holder types identified belong to the group of scientific bodies (17) and governmental agencies (16). This is followed by civil society actors and businesses (9-9), and finally, very rarely, organisations rely on the knowledge of local communities and citizens (1-1).

1. **Scientific bodies** are frequently consulted both by SPSIs and policy organisations, although SPSIs more often list these than policy organs. Scientific bodies include **expert groups** (selected for instance from member states for the preparation of the CAP by DG Agri), **diverse and thematic expert panels** for horizon scanning and foresight (e.g. UNEP) and **thematic working groups** studying for instance social indicators, economics, ecosystem services or resilience (e.g. ICES). The selection of these expert working groups can happen through **open calls** to member organisations (e.g. Future Earth), or by relying on already **existing networks** of knowledge holders (like in the case of the Eionet network, which includes public bodies in member states but also some universities and NGOs). Policy and SPSI organisations also rely on **existing and past research projects** (and their researchers) to gather policy-relevant information. For instance, individual Horizon projects and past Biodiversa+ projects can serve as sources of data, assessment, and success stories that inform policy decisions. In order to support the 'Cohesion for Transitions' (C4T) Community of Practice that exists within DG Regio (described below), the DG also created an **academic sounding board** to advise the C4T by addressing specific implementation challenges and providing analytical work on cohesion policy.

2. **Governmental agencies** are also frequently engaged for knowledge provision, especially by policy actors, who much more frequently list these agencies as knowledge holders than SPSIs. Agencies include various **DGs**, the European Environmental Agency (**EEA**), the **JRC,** the **KCBD**, or global organisations such as **FAO** and the **OECD**. There are also platforms and European networks that are relied on for knowledge provision, such as the **ENEA-MA**: European Network of Environmental Authorities and Managing Authorities, or the **EU-CAP Network** (formerly EIP-Agri). Some DGs (DG Agri and Regio) also reported having **internal knowledge platforms**, such as the **Cohesion for Transition (C4T) CoP**, which brings together managing authorities of funding programmes, national, regional and local authorities, public bodies, and stakeholders involved in the implementation of cohesion policy to share experiences and find joint solutions. C4T has three thematic working groups, which also have cross-cutting meetings, for instance on public procurement or monitoring investments. DG Agri also reported having processes between its own units for internal silo breaking and horizontal exchange. Internal knowledge platforms in the DG Agri are also informed by the experiences of **living labs and lighthouses** implemented in different pedoclimatic zones.

3. **Civil society** organisations mainly enter knowledge provision processes in two ways: 1) they are either **part of platforms and networks** that gather data and information, which then can be taken up by policy, or 2) are being included in **stakeholder workshops and consultations** in areas where research projects are conducted. Networks include for instance the **EU-CAP network**, whose Assembly comprises representatives not only from managing authorities but also EU-wide NGOs and local action groups working in the agriculture sector. It sets up and provides funding for operational groups through the

national CAP strategic plans and multi-actor Horizon projects which involve a diversity of actors in the field.[3] **Eionet**, or the European Environment Information and Observation Network is another platform, mentioned by EEA, which mostly includes national organisations and environmental protection agencies from different countries, but which, to a limited degree, also gathers data from civil society groups. The second type of engagement such as stakeholder workshops, forums and consultations are frequently undertaken by UNEP and ICES to make research more impactful and to co-design research processes, such as biodiversity monitoring projects (UNEP).

4. **Businesses** that are engaged by SPSIs and policy organisations are involved through similar processes as civil society actors, either as stakeholders in research projects or as data providers, e.g. in the EU-CAP network. IPBES involves private actors through individual collaborations, for instance as contributing authors in IPBES assessments. It is highlighted by interviewees that private actors need to see the benefits of participating in knowledge production and provision processes and these benefits can come in various forms (financial, recognition, knowledge, etc.)

5. **Local and indigenous communities** are explicitly engaged only by IPBES in their assessment reports. This is argued to be a good way because it provides official recognition to participants in terms of citations. However, engagement of local representatives is much harder in IPBES task forces because there is little reward or recognition for their work and thus often there is a significant proportion of participants remaining inactive.

6. **Citizens** are engaged through citizen science, both within the governance of Biodiversa+ and also in its supported research projects, such as in biodiversity monitoring. Biodiversa+ also engaged citizen science organisations through workshops to learn about how to involve citizens in their own work and to support them in the identification and collection of good practices that could be upscaled or transported into other contexts. However, no other organisation mentioned engaging with citizens for knowledge provision.

An important observation we can make about the above processes and engagement forms is that relying on expert groups for knowledge co-production can create a rather limited space for engagement. Depending on the process, it can mean the participation of a very limited number of people, applying a rather tokenistic approach to knowledge inclusion. As one respondent put it: *"[...] we have had to look for geographic diversity, gender diversity, age profile so that we've got young people engaged, and indigenous knowledge. Now you can only have an expert panel of 20, right? So, think about that on a global scale. You're, you're only getting representation"* (BioAgora_t41_no4). An important question for the SSBD is how to create processes that rely on multiple sources of knowledge and create possibilities of involvement of underrepresented stakeholders in a meaningful and representative way so that the complexity of certain policy problems can be effectively addressed.

Clearly, there is a wide variety of techniques to involve non-academic knowledge of stakeholders and citizens, the experiences of these, however, are not always positive, and many interview partners see this process as challenging or as a struggle, in spite of their clear commitment. Some examples and lessons are presented in Table 5 below.

[3] https://eu-cap-network.ec.europa.eu/support/innovation-knowledge-exchange-eip-agri_en

Table 5: Forms and context of transdisciplinary engagement mentioned in interviews

Form of engagement	Possible problems mentioned	Advantages, solutions to improve outcomes, good examples
Short-term workshops, dialogue groups, focus groups, etc.	• Often touch only the surface of many different problems instead of providing deeper understanding, for instance because participants arrive with their own agenda or question, and not with commitment to discuss or deliberate around a certain topic. • Problems with efficiency – time-, resource and effort-consuming, and often not that productive • Issues of representativity	EU CAP Network focus groups of 20-20 people are mentioned as a good example • Established structure, open call • Balanced in terms of inter- and transdisciplinary background, member state origin, gender • Provides enough time (2 full days)
Involvement of non-science actors in a permanent organisational unit (e.g. Advisory Board)	• Limited • Issues of representativity	May ensure access to societal- as well as science-policy interface-expertise
Relying on existing structures or principles like the EU partnership principle	Admittedly, biodiversity is not an outstandingly appealing topic for business organisations, which makes the co-financed projects harder to carry out.	In theory, in co-financed programs, the involvement of private (non- or for-profit) organisations should be automatic
Engagement of "practitioners" (stakeholders, citizens) in research		• Living Lab concept • Citizen Science initiatives
Discuss policy issues directly with a diverse group of stakeholders	• Reluctance from the side of policy-makers to engage in co-design methods • Time- and resource-consuming	• UNEP Antarctic Treaty – discussion of policy-makers as well as interested and non-interested parties • Online platforms offer a great potential • May prove to be more efficient on the long run

Stakeholder groups that are not engaged to a sufficient degree in SPSIs but should be represented were also highlighted by respondents. These include:

- Scientists in underrepresented countries, and in Eastern European countries in particular
- Indigenous and local communities
- NGOs
- The private sector
- Local professional groups (e.g. farmers, etc.)
- Young and early career researchers

As mentioned before, compensation is an important aspect of successful engagement of underrepresented groups. The form of appropriate compensation can vary depending on the group and it is important for the SSBD to consider a diversity of options such as scholarships, salary, benefits, recognition, capacity building, knowledge, mentoring, etc. In addition, it is also important that compensation is not ad-hoc, but institutionalised and transparent in order to build trust, engagement, and commitment towards the process. As one respondent put it: "*How can we pay back to them? What is the currency relevant for them? This is still unclear. Do they need money, scholarships, tax exemptions? These should be sorted out before engaging them to have a clear offer. […] There are good examples where IPLCs get back some very visual recognition, e.g. Zsolt Molnár's movies on traditional herding and building of a community of practice at the level of traditional knowledge -but this is not institutionalised but led by one researcher*." (BioAgora_t41_no8)

In terms of early-career researchers, the SSBD can build upon several examples of ECR engagement and empowerment in Europe and think creatively about their involvement and remuneration (see for instance the European Geosciences Union's policy pairing scheme for capacity building or the inclusion of young researchers in the expert panels of UNEP). One respondent also highlighted that government agencies and member states tend to favour more established and senior scientists when recruiting members into scientific sounding boards or expert groups. There is a need to educate policy bodies and member states about the importance of involving younger scientists in science-policy processes. Doing so can significantly enhance the innovation and transformative potential of SPSIs.

In terms of engaging business actors in SPSIs, it has been recommended that larger companies are considered as they have more resources and a more international, agile way of working that would allow for successful engagement and for the extra cost and time that the involvement requires. This approach, however, takes us back to the issue of compensation and the underrepresentation of more marginalised voices in the science-policy nexus. Engaging smaller SMEs in the area of biodiversity research and decision-making could allow for more tailor-made and effective policy responses.

In general, there is a need to consider knowledge plurality more systematically in the SSBD. While plurality is more prominent in some areas, such as impact assessments, the need to take local requirements into consideration in biodiversity decisions has not yet been seriously and systematically addressed in the science-policy field.

4.2.3.2. How can knowledge be co-produced, synthesised and shared?

In most cases, policy actors describe knowledge gathering as a one-way process, where data is collected from various sources (government agencies, SPSIs, expert groups, or scientific publications) which is then further assessed internally. There are very few policy actors (mainly DG Agri) that report relying on knowledge gathered from other types of knowledge holders such as civil society, businesses, or local

communities, and even in these cases, knowledge is collected from stakeholder engagement processes in a one-directional manner, rather than through mutual exchange or co-production processes. Most collaborative processes that are undertaken by policy actors take place between or within the various government agencies and DGs or through collaborations with member state actors, e.g. during the negotiation of the CAP.

This means that knowledge production for policy still mostly follows the traditional one-directional approach where scientific bodies produce data and knowledge outputs which the policy community either adopts or not. SPSIs, on the other hand, show greater capacity to involve more diverse actors and to shape their governmental structures and processes in a way that allows the inclusion of diverse knowledge holders, sometimes already at the decision-making level (e.g. in assemblies). In this way, knowledge co-production does not only take place at the lowest levels of research project implementation and fact finding, but already at the stage where scientific projects are planned and relevant questions are established. As one respondent also explained, doing **real co-production means changing the direction of research and implementation plans due to stakeholder input**.

As he put it: *"I've yet to see a project that does real co-production. We still just go out to stakeholders. We have a webinar or a workshop. We say thank you for your input, and then we all go back into our silos, and we just produce outputs. [...] Real co-production requires a willingness to listen to stakeholders and allow their voice to actually change what you're doing. If you do real co-production, stakeholders have to be there to make decisions with you. And that decision might be: "actually no, your idea sucks. I don't want to use that output you're creating. It's completely wrong. I need something else"* (BioAgora_t41_pilot2).

Real co-production requires not only the presence of diverse stakeholders at important junctions of the science-policy nexus, however, but also a different way of working. It requires **responsiveness** to stakeholder perspectives on the side of policy-making. As one SPSI-actor interviewee put it, there is a need to treat stakeholders like clients in a business "rather than just like a tokenistic goal". This requires a willingness to change direction as a project moves along rather than sticking strictly to predetermined milestones and goals. This means a more **short-term, agile way of working**, but one that can integrate the evolving needs of many different stakeholders, including those of policy-makers.

Having policy-makers at the table together with scientists and other stakeholders such as businesses and civil society can fundamentally shape this process and enable co-production. Through the example of trying to end plastic pollution, one respondent highlighted that the various politically and technologically feasible answers (e.g. recycling, production reduction, direct ban) can only be sufficiently assessed if all the relevant actors are included and if regulators truly understand the extent and the complexity of the problem:

"*that's why you need the policymakers in the same room. And I keep arguing in the plastic space, get the regulators in there. […] So, you need to have those discussions and scientists don't understand that actually that makes a difference in the language in terms of a policy setting. So, to me, this is where we've got to, you've got to have them in the same room. If we can achieve that, actually I think we will end up with much better policy*" (BioAgora_t41_no4).

Naturally, many of the capacities that can allow the SSBD to function in this way need to be developed as the Science Service is built. Capacities are needed both at the personal and the institutional level and there are many processes that can facilitate this. To learn more about how these capacities can be developed, see D5.1.

4.2.3.3. Outputs of knowledge processes

For the SSBD, it will be critical to understand what outputs and products it aims to create through the SPSI process. This question determines the role that knowledge producers will play in the Science Service. For instance, if knowledge holders, especially scientists, are expected to play the role of **honest brokers**, then their outputs will include scientific reports, evidence synthesis, or in-depth assessments. However, policy actors sometimes expect knowledge producers to go one step further and provide **advice** and **opinion** on particular policy questions. In these cases, the knowledge producer is expected to play the role of an **issue advocate**, and take a position based on either pre-defined goals or personal and professional commitments. Some SPSI actors, however, feel uncomfortable with this role. One respondent explained this in the following way: "*They wanted to have a direct link with what they were doing. Not wanting to…, I don't know, I don't want to use the word "read between the lines", but they wanted the direct input from the expert and not having to maybe read the whole evidence report. [...] You know, once you have the evidence report, there is still one step to go in comparison to what you want to achieve, and they want us more and more to bridge that. And for me this is opinion. This is opinion of what they are supposed to do, and they take it, or they don't take it*" (BioAgora_t41_no9).

This issue was also expressed by another SPSI actor, in relation to the tendency of senior, more established scientists wanting to step into the role of issue advocates and by doing that, "*stretching the science where it should not be going*" (BioAgora_t41_no4). According to this interviewee, some SPSIs operating at the global level are now aiming to work with more junior scientists because they are better at representing the information accurately rather than advocating for certain positions.

While some scientists aim to remain in the position of providing neutral and scientifically established information, others feel the urgency to shape decision-making processes and may be glad to step into the role of an advocate. The line between the two can sometimes also be blurry as not all scientific answers are indisputable.

One potential approach that the SSBD could take to resolve this dilemma is to create separate processes for the two forms of knowledge creation: one for the scientific body to create scientifically established knowledge pieces and evidence reports, and one for an open deliberation, where the scientific findings can be discussed in a transparent manner. In the second stage, if the policy-making body needs science-based recommendations and opinions, this can be developed as part of a co-creation workshop or policy lab, facilitated by the SSBD. Here, the scientific expert group can share its input, and the policy recommendations can be co-developed with policy-makers and potentially other relevant stakeholders as well.

4.2.4. Ethical measures

Ethical measures refer to the measures applied by the interviewed organisation to prevent, tackle, or resolve ethical challenges such as conflicts of interest, favouritism, bribes, discrimination, falsification of documents, misuse of evidence, influence peddling.

Few organisations mentioned having ethical measures built into their operative processes, such as dealing with conflicts of interest, bribes, favouritism, document falsification, misuse of evidence, influence peddling, and others. Eklipse has an **ethical infrastructure** in place, including the use of non-disclosure agreements (NDA) for instance, which is perceived to substantially aid trust-building among participants when sharing information with each other. **Vetting processes** are also in place at Future Earth and IPBES when sending out open calls to members ensuring the diversity of backgrounds of the participants. In IPBES, for instance, there is a quota system to represent the various geographic regions of the United

Nations in its different bodies. It also designed an independent approval process for publishing based on IPBES materials, while collaborators need to sign a conflict-of-interest declaration when working with the organisation. Besides these processes, interdisciplinarity, transdisciplinarity, and gender aspects are more regularly considered by the interviewed organisations, both in case of research calls and in their internal organisation such as in evaluation committees, for which formal ethical guidelines can also be introduced (Biodiversa+). It has been argued that having an ethical infrastructure in place can foster the development of co-creation processes by increasing trust among the participants.

Besides the ethical questions that organisations may implement to deal with the above issues, there are also other topics that came up during the interviews that relate to ethical questions within the SSBD. These include **representation, transparency, objectivity, and voluntary work**.

As regards to **representation**, there is a question of how to represent the scientific community in a way that reflects the complexity of science and, at times, the contradictory positions of scientists. Will the SSBD be accepted by the science community as a trusted and reliable voice supporting policy-making? Besides representation, this question of course also relates to issues of transparency and objectivity. The topic of representation also appeared in the context of an organisation representing its members. For instance, Alternet interviewees argued that Alternet needs to speak for its partners and not develop its own independent voice, otherwise it could easily break up. This can become a critical question for the SSBD as well when it comes to the fair representation of the scientific and non-scientific knowledge holders whose participation it relies on. It was argued that fair representation also means that there will be conflicts of interests and this is the reason that there is so much resistance against working collaboratively in the science-policy nexus. The more stakeholders the SSBD engages in its processes, the more prominent the question of conflicting interests can become.

The question of **transparency** arose in two different contexts: firstly, in terms of being transparent about all the data that is used to produce assessments and scientific advice. This can happen through, for instance, data profiling tools which is a transparent data hub where all the information that is used in integrated ecosystem assessments is available to the public. EEB, Future Earth and ICES all emphasised the significance of transparency in their operations. Another aspect of transparency relates also to inclusion as well as back to the question of representation. EEB emphasised that to remain transparent to one's members, all the positions of the organisation need to be co-developed. For instance, during the development of the nature restoration law, EEB spent months bringing members on board and incorporate their views so that during their briefing work at the European Parliament, they knew that they represented their members' views. "*In the end when we had a position we didn't need to go and double check with them [the members], […] we could just base it on the position that we have taken before*" (BioAgora_t41_no10).

Objectivity was mentioned in two different contexts: on the one hand, it was emphasised that the role of the Science Service is not to manufacture answers that policymakers would like to hear, but to provide them with honest assessments and also educate them on the things that are not going well. On the other hand, it was also mentioned that scientists sometimes see themselves more as advocates for certain policy solutions rather than carriers of objective knowledge. This was mentioned in the context of more senior scientists in particular, as was already quoted in the previous section related to the outputs of the scientific process.

Lastly, the **voluntary engagement** of knowledge-holders raises both ethical and quality assurance questions for the SSBD. While there is a question whether knowledge-holders should be expected to engage in the SSBD without (financial) compensation, the quality of work provided can also not be ensured if scientists (and non-scientific actors) are not compensated for their time. As one interviewee stated: *"we had a group of people who voluntarily developed a report for us in a particular area. And the report wasn't*

of great quality. […] in the end, we end up with something that's actually not fantastic. And then we're actually having conflicts with the scientists because we're saying, well, this is not good enough. And they're saying, well, I don't have time to do any more" (BioAgora_t41_no4). An important question for the SSBD is how to ensure quality and reliability from engaged knowledge holders and how compensation forms and structures could aid these.

4.2.5. Ensuring relevance and reaching policy impact

The "ensuring relevance" code refers to the measures applied by the interviewed organisation to ensure that relevant knowledge is accessed or provided in a timely, robust and reliable way, and that such knowledge responds to specific needs. The "reaching policy impact" code refers to the best practices mentioned by the interviewed organisation on how policy impact can be achieved. Since these two codes were highly interrelated and partly overlapping, we are analysing them together. Many of the aspects analysed here were mentioned already under different codes, notably among the intreviewees' expectations towards the SPSI – we will point out these interrelations as well.

4.2.5.1. Conditions for a scientific input being relevant

It is worth noting that before the launch of the Eklipse project, which now is getting requests not just from the EC but also from national governments, NGOs and even universities "*the idea of having a mechanism which specifically addressed the needs of policymakers and other decision-makers [in terms of biodiversity], didn't emerge*" (Bioagora_T41_no9). Nevertheless, according to the interviews, the main conditions for scientific input to have impact on the policy process is that it reflects actual need in a timely manner, in digestible format, and is not just received and understood but also trusted by politicians.

a. Reflecting policy need and reaching policy decision-makers, policy officers

For science to reach relevance, it has to be at least aware of what is currently needed by policy. This need, to some extent, is reflected in the EU R&D policy instruments (scientific research grants being issued in relevant topics). However, further support and emphasis of the policy landscape can strengthen science's ability to stay relevant and reflect current policy needs.

According to an SPSI-interviewee, the best way for that is to engage with policy-makers directly. This can happen in more informal gatherings like a summer school, or by meeting policy-makers and simply listening to their needs. The transformative potential of the summer school-like events is greatly emphasised, also pointing out that in this context, information exchange happens both ways and these are equally important: policy-makers learn about science, and scientists learn about policy-making and what is relevant for and needed by the policy-making field. Nevertheless, the reach of such events is very limited.

One perceived reason scientific evidence fails to achieve policy impact is that scientists don't think that communicating their results outside of academia as part of their job: *"But it's true that some of our beneficiaries, they have a great job, they do a great job, but sometimes it stays within the project. They don't reach out with this; they don't provide the information that they gathered in the project or the experience to the competent authorities. And then that's what we try to encourage"* (BioAgora_T41_no7). Consequently, scientific evidence simply does not reach policy-makers. There are examples for the opposite as well, certain scientists being extremely active in communicating the results they find important. This problem arises partly because the traditional channels through which academia makes

their results visible, which are mostly scientific papers, have limited visibility for policy-makers, or at least they may disappear from their "radar" quickly. Many SPSI actors point out their efforts (e.g. meetings, exchanges between scientists and DGs, or even direct translation and channelling of new scientific results) to intensify both the awareness of policy priorities and the scientific community's activity at the policy-project interface. Explicitly including the mandatory development of policy products (e.g. policy briefs) in scientific grants, or mandating "knowledge brokers" to bridge between academia and policy arises as a possible solution here, while the motive of "pushing" scientific projects to share their results with relevant authorities also appears repeatedly – even if by just an a priori identification and articulation of probable outcomes worth being fed back to policy. Publishing "success stories" of how scientific input was utilised in the policy process and made an actual impact is also mentioned as a tool to motivate science in policy communication (even if measuring such impact is admittedly very difficult).

According to interviewees working at SPSI organisations, in ensuring that science fulfils the knowledge needs of policy, science itself has an important role in helping policy ask their questions the right way, so that they really get answers to what they are interested in. This assistance in refining and reformulating requests consists of three elements: scoping for already existing evidence to avoid duplication; revealing aspects that can be of interest but were not included initially; and reformulating the rest of the request if needed: *"we bring the scoping group with a requester and we discuss with them on their needs, where we dig and dig until we really understand why they ask this question. What is actually behind this nice formulation. Because often we receive a nice formulation, but first it would be very difficult to answer it. And second, you realise it's not what they want."* (Bioagora_T41_no9)

Some go even further than assuming that the job of science and SPSI here is just to make sure that the information reaches policy-making – if the goal is to reach policy impact, and its probability can be increased by, for example, public pressure, then public pressure should be applied. Which implies communication with the media or directly with society as well. This, however, raises the supposed role of science in policy-making.

b. Timing / Timeliness

Timing arises as one of the most important factors in terms of the policy relevance of scientific results. There is agreement that science is slow – though it is also acknowledged that to some extent this is unavoidable. The issue is clearly demonstrated when, mainly by accident, a certain piece of scientific evidence is right at hand at the time of the request, but usually this is not the case: *"And they're like, "we need it now." And they meant like now, now, by the end of today, and we were like able to go "okay, not a problem." And we were able to give it to them in five minutes because we just finished it all. So that created impact […]" (*BioAgora_T41_no6).

One suggested way to solve this issue is for science and policy work more closely together, in a more iterative, "agile" way, on one hand so that science can understand policy's needs quicker, and on the other hand so that if something is not working, it can become clear faster. This can especially be relevant in case of long-term requests from policy to science, where there is time and space for such an iterative process: *"there's a lot of pride within the scientific community and kind of a lot of ego. And if things aren't working, I think it's quite difficult for people to put their hand up and say, actually, we don't think this is right. (…) the way horizon projects are structured, you sometimes don't know if that failure is built into the system until right at the end by which time it's too late."* (Bioagora_t41_pilot2).

From the other way around, some point out how scientific inputs have their windows of opportunity to achieve policy impact. This, on one hand, relates to major policy events, when an issue is on top of the agenda, like the revision of CAP or the debate of the multiannual financial framework. On the other hand,

elections (both national and EP) provide opportunities to communicate issues effectively. And in general, quick reaction is key – the scientific community can have an impact if they catch the momentum when the EC asks for something – otherwise the information science provides can be lost. This is especially relevant in case of urgent requests.

The experience of SPSI organisations, on the other hand, highlight the importance of preparatory work inside of the organisation, to discuss possibly relevant topics, pre-assess options and preferences as well as feasibility in political terms, come to internal agreements ahead of time, and be ready once the decision-making party reaches out.

A related issue is the case of future research, which is both about impacting policy agendas, and aligning future research initiatives with such policy agendas. SPSI is described by the interviewees as existing in the present, aiming to confer presently available scientific facts to policy-making, which is perceived as a missed opportunity.

c. Understandability – communication, language

Communication of scientific evidence, or, in other words, the accessibility of scientific knowledge appears as one of the most important conditions for science to become relevant for policy-making, as was emphasised in section 4.1.2 already. Different organisations put it in different ways, but at the core lies the necessity for science to be translated, brokered to policy- and decision-makers in a way that they can fully understand and possibly directly use it without having to spend too much energy on processing. One important aspect of this, as was mentioned in section 4.1.1, is conciseness: *"(…) that's what people wanted (…), especially politicians. They need simpler pictures and simpler stories that they can go back and relate to instantly and they don't have the massive attention span. They don't have time. So, a 400-page report will never work with them because they're not going to look at it. They've got two minutes. Their team have more time. So that's what the layering of the products"* (BioAgora_T41_no6). On the other hand, as pointed out in section 4.1.2, this simplification in communication should not affect the scientific honesty and complexity of the message itself. Some even compare science communication directly to selling a product, and advocate adapting the tools advertising companies use, to provide resources to those units inside EU (mostly DGs) who are in the position to "sell" knowledge to decision-makers. The power of stories was also mentioned – presenting good practices that people can relate to can have a great impact. It was also pointed out that it is not just science that has its unique language, but decision-making organisations too – depending on if you are in the UN, or the EU, or in a member state, different language will be used, which also has to be taken into account, as well as the vocabulary and terminology used, which should be as unified as possible, for the same words meaning the same things.

An important aspect of science communication is that it aims to get information to people and to policy and politicians (and even to the broader society) at every level, otherwise decisions may rely on scientifically incorrect views and mere economic interests, however, even the economic interests may be misunderstood and misinterpreted.

d. Trust

As is clear from the previous section, the issue of trust – in several aspects – is one of the key conditions of scientific and policy impact to be achieved. As discussed earlier, trust in its academic meaning, i.e. in the scientific trustworthiness of evidence, can and should be established several ways. Besides the strictly scientific dimension of trust, however, the much more general issue of readiness to rely on somebody's words is also a prevalent problem, also raised in the interviews. Some mention, for example, previous bad

experiences with SPSIs, while good experiences may increase trust, besides potentially ensuring a deeper scientific impact. Organisational bodies and a transparent process structure presented in section 4.2.1, as well as clear measures to ensure an ethical operation as described in section 4.2.4 can play a crucial role in ensuring trust.

Trust relates very closely to communication, of which the content and how it is formulated, is just one element. Some point out that effective communication of science also requires trust from both sides. This more empathetic approach of communication between science and policy emphasises that "humanising" the dialogue, placing it in a safe, welcoming environment for science people and policy people to be together can have very far-reaching effects in getting scientific knowledge to reach its impact, while emphasising this human dimension is very rare: *"To try to make it less ivory tower (…) We have sometimes really, really nice discussions. (…) At the end, it's a change of behaviour. We are all in there together."* (Bioagora_T41_no9)

The importance of trust is also reflected in the numerous mentions of the impact of informal, personal connections, which was identified as one typical way of engagement of key actors in the field in section 4.1.1. This relates to how a certain piece of information may reach its goal via largely unknown ways, probably reaching a decision-maker from a trusted acquaintance. And on a larger scale, the role of certain individuals probably with charisma and a well-developed network was mentioned, and how they can create or intensify connections between communities inside or outside of science – how *"individuals [can] make a huge difference*" (Bioagora_T41_no1_pilot). But the apparent problems with the opaque and bounded nature of such impact are also pointed out. On the other hand, it seems that once trust towards a segment of scientific community is established, it will enhance policy-makers' openness not just in relation to particular pieces of information provided by certain people, but towards the more general values and aspects represented by the scientific community – or, in other words, reaching transformative change.

e. Place and role of science

An additional issue often appearing in the interviews and in diverse ways is the role and place of science in- and outside of the policy process. Some suggest that science can provide a place to collaborate, where no politics is involved. Others point to the unequal power relations between science and policy, with science often treated as a mere provider of knowledge towards stakeholders, something that was also mentioned among the "no go lines" in section 4.1.2. There is a clear wish from some parties towards science becoming much more aligned with policy needs and acting as a professional service provider.

But probably the most important question, also reflected upon in previous sections, is what exactly is expected from science by decision-makers, which is a conflicted area even among the interviewees, depending on their role and background. Some claim that policy-makers want answers, not science itself, they want to be told what to do. Others, on the other hand, state that this is an unacceptable expectation, claiming that science has to remain fact-based and positivist, and avoid normative, opinion-based outputs.

f. Knowledge management and internal mechanisms of science

One source points out that knowledge accumulation inside science is also often problematic, especially when information exists in a scattered, disaggregated manner. They point out that this is not specific to biodiversity – public health observational goals are struggling with the same issue. There is a lot of data available at national or regional level or in the hands of specific scientific or academic units, but it does not aggregate to a higher level where meaningful policy utilisation would be possible.

One example partly to overcome this is implemented in France, where all the biodiversity-relevant projects are called together yearly, to discuss their findings, challenges, and also to give input on national policy priorities. Another possible, however passive, solution to this lack of knowledge coordination mentioned is the creation of databases on projects. Some also mention the convenience of people being involved in different projects and organisations at the same time, thus having access to a wide set of information – which can be a viable model, however, raises several questions on transparency, power concentration and sustainability – and also to how much can be expected from one individual.

4.2.5.2. Conditions for a policy being relevant, in relation to its scientific basis

The aim of policy-making is to create relevant, successful policies. However, as also pointed out by interviewees, assessing whether a certain policy was successful or not is far from straightforward: currently it is mostly based on output measures, but there is a will to make the assessment more outcome- or result-based. How to do that in a reliable and valid way, on the other hand, is still uncertain.

According to the interviews, to ensure policy relevance and impact, the three necessary conditions are (1) relying on evidence from a suitable array of disciplines (interdisciplinarity), (2) relying on evidence from a suitable variety of knowledge systems (transdisciplinarity), and (3) Coordination during policy formulation (intersectoral cooperation). Two of these – interdisciplinarity and transdisciplinarity – we already discussed in the previous section. Here we elaborate more on intersectoral cooperation.

a. Coordination during policy formulation (intersectoral cooperation)

Cooperation between different units of EC (i.e., between different DGs or research units) is a frequent topic of discussion. Some interviewees claim that the silo-approach so well known as one of the main hindering factors of designing successful policies is overcome in the EU for a long time, and there is a lot of cooperation and joint work within and between DGs in different sectoral areas. Others mention institutionalised procedures to cooperate with other DGs as well, however, also point out that such kind of cooperation and networking is impossible to fully formalise.

Some point out that informal, personal connections can help even in case of such high-level cooperations.

In spite of dedication and partial success, however, problematic signs are also present. One type of these is that, however well and closely DGs cooperate with each other, realising even member state level diversity in their working groups, what happens outside of the EC is out of their reach. This is reflected by one of our interviewees stating that they received severe critiques in the parliament, in spite of member state representatives being included in the platform that created a document in a fully harmonised way.

Also, despite all the efforts, the multisectoral approach is still not entirely accepted by all parties. This probably is even more problematic in case of topics like biodiversity, which, on one hand, seems to relate very exclusively to biology or ecology, while in fact is affected and related to an extremely wide range of topics, most of which are closely connected to human behaviour. On the other hand, when successful, extensive collaboration can also create further problems, due to the lack of capacity.

4.3. Results of the workshops

The workshops allowed participants to have hands-on experience of participating in a model SPSI process, solving a specific biodiversity-related problem from the perspective of diverse stakeholders. Following the workshops, participants had the opportunity to reflect on their experience and on the requirements for a successful SPSI process. Participants reflected on several themes useful for our in-depth understanding of how science and policy could work together more productively in the SSBD. In the following, we highlight these themes and elaborate on how they can be applied to the governing processes of the Science Service.

4.3.1. Potential tools to boost co-creation in the SSBD

First, we summarise the tools applied or discussed during the three workshops, based on reflections and feedback provided by participants. The primary tools introduced were consultation, facilitation, and appointing a spokesperson per group. In addition, a range of complementary methods – such as stakeholder games, demonstration sites, and role-playing exercises – were mentioned as potential tools to support inclusive policy-making. Participants' experiences and insights during the sessions provided information to the evaluation of each tool's relevance, effectiveness, and possible future application within the Science Service's processes.

a. Consultation

Consultation was used in all three workshops and proved to be a critical tool for multiple reasons. It helped participants understand the broader context and the complexity of the issues at hand. It also enabled them to consider other stakeholders' perspectives, acquire new knowledge, challenge their own assumptions, and ultimately reach more robust and well-founded agreements.

b. Facilitation

Facilitation was not used during the workshops due to the small number of participants. However, according to participants, it would have played an important role in larger group settings. A key challenge associated with facilitation is ensuring the facilitator remains neutral, which can be difficult to achieve. In this regard, public authorities could potentially serve as unbiased facilitators, helping to guide inclusive and balanced discussions.

c. Spokesperson

Similarly, the role of a spokesperson was not employed, due to the limited number of participants. Among the tools discussed, this was considered the most controversial. A central concern was whether a single spokesperson could genuinely represent the diversity of views within a stakeholder group.

d. Other tools discussed

Several additional tools were discussed throughout the workshops. These included showcases, demonstration sites, and study areas where participants could observe how a certain issue happens in a real-life setting, or how different solutions function in practice. Stakeholder games were also proposed as a useful method; in these role-playing activities, participants argue from perspectives they may not personally hold, encouraging them to step into the shoes of other stakeholders and develop a deeper

understanding of differing viewpoints. The workshop format itself was recognised as a potentially valuable tool for the SSBD. For example, stakeholders could be invited to take on reversed roles, or policy-makers could be taken into the field to engage directly with the environments where stakeholders live and work. Such experiences foster informal learning and create opportunities for deeper, more empathetic understanding. To support critical reflection, certain built-in toolkits could be used. If designed carefully, these might help participants analyse the historical and political context of a given issue, providing a more comprehensive and reflective basis for policy-making.

4.3.2. The perceived role of science in SPSIs

Participants highlighted several roles for science in the SPSI besides delivering scientific facts and analysis to decision-makers. Through the use of diverse toolsets, methodological frameworks, and scientific paradigms, science is able to produce a wide array of alternative solutions to social-ecological problems. With the balanced involvement of social and natural scientists, science can enlarge the number of options available to policy and to find solutions that are mutually beneficial for diverse social actors. Science can also be called upon not only to understand existing best practices but also to highlight the most important malpractices. Understanding the negative impacts of current policy and legal frameworks can help highlight the most critical intervention points for decision-makers. Moreover, participants also emphasised that SPSIs should not only focus on influencing and informing policy, but also on how those policies could be better enforced. This question should occupy a more central place among scientists and policymakers in the SPSI.

The downside of relying too heavily on the scientific method in the SPSI was also highlighted. In some cases, participants remarked that “the power of scientific facts was very scary” to experience. In the modelling exercise, public actors and representatives of more vulnerable groups were sometimes negatively impacted by the final policy decision, and the opinion of several of these actors became sidelined in the process in favour of the scientific opinion advocating for a particular policy solution. Across all the workshops, participants highlighted the necessity of involving public actors, NGOs, and civil society groups in the process of knowledge generation in order to arrive at more balanced and more representative policy recommendations. The involvement of social actors (e.g. through the Knowledge Agora and the societal champion role) in the SSBD can become possible avenues for the timely recognition of existing social tensions around environmental questions and for the generation of multiple, complementary policy options.

4.3.3. Successful participatory processes

Workshop participants agreed that it is important for the various knowledge holders to have enough time to truly understand the presented environmental issue and familiarise themselves with the many perspectives and interests that need to be taken into account for a productive solution. Biodiversity issues are tightly connected to the social and cultural context where they emerge and thus policy solutions can benefit from the inclusion of diverse perspectives, including a diversity of scientific actors from different geographies, age, gender, background, etc. The involvement of early-career researchers and younger generations in the SPSI was particularly emphasised, as they can bring in different generational perspectives and a vested interest in long-term, sustainable solutions that go beyond short-term political gains. A balanced curation of social and scientific actors can also help to find solutions that balance various stakeholder needs. It is considered particularly useful to involve stakeholders with challenges or conflicts to understand that the social positions are not always in sync with the scientific position.

In general, participatory processes should allow for contradictions and conflicts to arise during the formulation of scientifically sound solutions. When reaching a consensus was hurried in the process, the consensus tended to be very weak and the compromises too large for many participants to stand behind them. At the same time, the ability to compromise was considered an important part of the SPSI process, provided that the consensus is reached after sufficient discussion and deliberation. Participants emphasised that not aiming for consensus right from the start but actively looking for and sufficiently exploring the existing fractions will result in more satisfactory policy solutions in the long run.

Furthermore, making the SPSI transparent about how they work, whom they involve in the process and what impact they have on policy formulation and enforcement can greatly influence knowledge holders' willingness to be involved in SPSIs. The SSBD could showcase examples of how past deliberations led to positive policy outcomes and what the SSBD does to balance the perspective and knowledge of various stakeholders involved in the process. Transparency regarding the process can help create ripple effects in other regions or thematic areas and can encourage participants from various backgrounds to get involved.

4.4. Synthesising empirical evidence

Based on the lessons learnt from the interviews, workshops and desk research carried out by our research team, we created a causal loop diagram (CLD) (see e. g. Barbrook-Johnson – Penn, 2022), the graphic map picturing the complex system of the future Science Service, including also its governance and operation (Figure 4). We present it here to illustrate how the designed governance framework we introduce below is tailored exactly to the expressed perceptions and needs of stakeholders.

CLDs are qualitative analytic tools of systems analysis – they help understand and analyse a complex system, where long causal chains, non-linear relationships, feedback loops, and delays may be present. Each node of the figure represents a significant element (phenomena) of the system, and each link represents a direct causal connection between two elements following the direction of the link. Solid lines mean that the two elements are directly proportional or linked "positively" (they "move" or change in the same direction), and dashed lines mean an indirect proportionality or a negative link between the two (they "move" or change in opposite directions). The element categories we assigned ex-post are: attributes of "good" (successful in terms of environmental and acceptable in social terms) policies; transformative aspects/elements of the policy process; conditions of scientific relevance; attributes of the SPSI governance, which can and has to be directly influenced, and designed appropriately by the BioAgora project; and external or accidental factors, not or just very moderately affected from inside of the system.

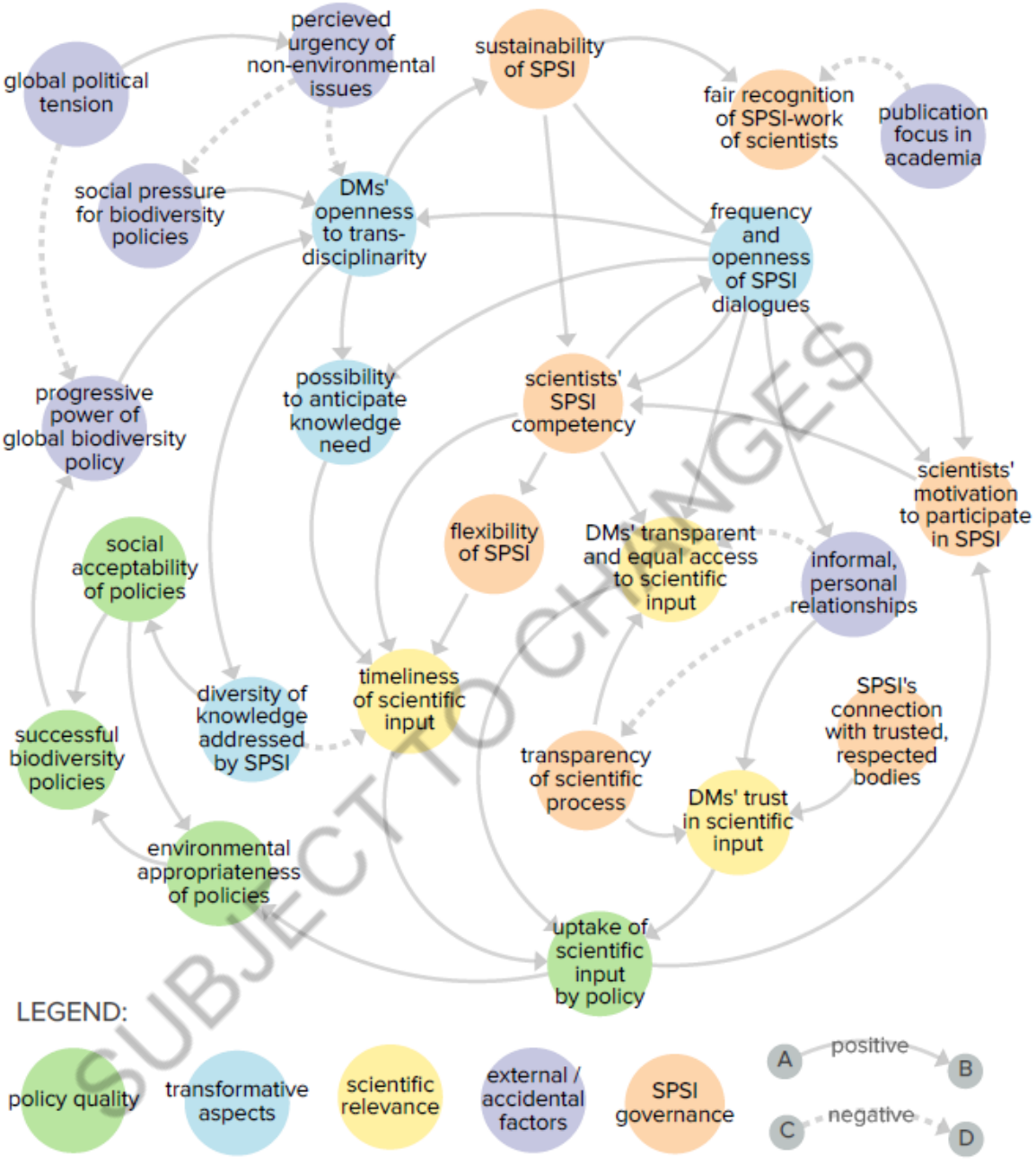

Figure 4: The system surrounding SPSIs, with relevant policy elements

As the ultimate goal of the system, we defined the creation of successful biodiversity policies, in the sense that policies achieve what they intended: namely mitigation of biodiversity loss or even increase biodiversity. For this, these policies need to be, on one hand, appropriate in terms of underpinning science, and also acceptable for stakeholders so that the necessary behaviour change would happen. The more diverse knowledge (in a transdisciplinary manner, typically through deliberative processes) is

included by the SPSI, the more acceptable policies can be; while the "take up rate" of scientific input can be increased by its timeliness, transparency and access, and the trust decisionmakers, in general, feel towards this input. Timeliness can be enhanced by the possibility of the SPSI to anticipate decision-makers' knowledge needs, as well as the flexibility of the SPSI and the SPSI-capacities of scientists; while involving more diverse knowledge most probably lengthen the process. Decision-makers' trust in the scientific input correlates positively with the transparency of the knowledge compilation process and if the SPSI is related to other, trusted and respected bodies. If the input comes from personally known and trusted acquaintances – long-known fellows, friends, old colleagues – will also ensure trust of those involved in such encounters. The more significant these are, however, the worse the access to scientific input of the decision-maker sphere as a whole will be, with a diminishing transparency of the knowledge brokering process itself: those who have access to such personal connections will be informed and trust this information strongly, while the others won't have access to similar knowledge, nor the means to control for the reliability and validity of the information received by others. The transparency and equality of access to scientific input can be strengthened by the transparency of the SPSI process, the policy preparedness of scientists, and also by the frequency, the openness and the power balance of dialogues on the interface of policy and science. These dialogues, as the high number of links attached to this node shows, are central for a successful policy process: they enhance scientists' policy preparedness, transparent and equal access of decision-makers to scientific input, as well as the ability of the science service to anticipate knowledge needs of decision-makers, and – being involved in meaningful encounters and experiencing the liberating and empowering nature of co-creation – also decision-makers' willingness to embrace a more transdisciplinary perspective in policy-making (which, in turn, may further enhance the possibility to anticipate knowledge needs as well as the diversity of knowledge involved, not to mention the sustainability of the SPSI in financial and organisational terms by increasing decision-makers' dedication to support it). These meaningful encounters, however, also create personal connections naturally, which holds the possibility of decreasing transparency again – a possible weakness that should be controlled along the process.

The two remaining "streams" in the system are the ones directly related to the governance design of the science service, and certain accidental and external factors of great significance and power. In terms of the governance structure of the science service, one key element is the policy preparedness/literacy of science experts. This means a broad, transdisciplinary set of knowledge and skill related to the needs of policy-makers in terms of language, scope, diversity, and other characteristics of knowledge communication, as well as relevant aspects, boundaries and goals of policy-making, which may differ from the perspective of academic researchers. These capacities can be improved through frequent and balanced dialogues between scientists and policy-makers, by the operation of a financially and organisationally sustainable science service, which, for instance, may put efforts into capacity development in the appropriate fields, and by increasing motivation of scientists to participate in the process. This motivation is positively affected by different kinds of rewards or resources scientists get access to by participating, including the recognition of their work (either financially or as an academic record) – and, with great emphasis, the utilisation of their results directly in policy-making. This is a strong, positive feedback loop: a successful science service, resulting in higher policy uptake rate, enhance the willingness of science experts to participate, further increasing the scientific relevance or SPSI outputs.

Regarding external and accidental factors, one possible weakness is the extent to which SPSI work can be accounted for as academic performance. This is largely up to the academic sector, which – in spite of recent, significant advances and attempts – remains in "mode 1" in many countries and disciplines (Gibbons et al, 2010), being reluctant to open disciplinal boundaries and considering – and rewarding – only strictly scientific work and publication as accountable.

On the other end of the map, we have to face one of the greatest weaknesses of policy-making in biodiversity: the lack of positive feedback resulting from successful policies. This is not a unique phenomenon – public health policies face similar time lags (current interventions may have measurable effects in years' or decades' time) –, but the resulting lack in terms of a sense of importance, urgency, and – in case of a successful policy – achievement both from the side of decision-makers and the public is probably the greatest challenge the field faces. As the proverbial frog in the pot, no one ever will feel the urgent, immediate need to have one more kind of plant or insect around, even if it is clear for science that to stop what is set in motion, and what leads to inevitable catastrophe over time, immediate action would be needed. Social pressure towards better biodiversity policies can be enhanced through public awareness raising and capacity building, and global actors and "climate" in the field are also an important factor – however, environmental concerns are competing with other, global, often more urgent concerns, thus the perceived importance of a good biodiversity policy may fade easily.

5. Alternative options for the SSBD governance model

5.1. Why sociocracy? Core values and principles derived from interviews and workshops

Expert interviews and design thinking workshops conducted in Task 4.1, along with desk research, suggested that a lean and agile organisation with opportunities for knowledge co-creation and democratic decision-making would best suit the ethos of the future Science Service for Biodiversity (SSBD). The literature review reinforced that adopting a sociocratic governance model – or a hybrid approach – could address key challenges in the SSBD and foster transformative change.

Sociocracy, also known as dynamic governance, is a system of organisational governance rooted in the values of equality, collaboration, and distributed power. It aims to create an environment where all voices are heard and valued, fostering inclusivity and collective decision-making. Unlike majority rule, sociocracy employs consent decision-making, where decisions are made only if no one has significant objections. This ensures a cooperative approach to governance and emphasises mutual understanding.

Key principles of sociocracy include the use of interconnected circles, each with a specific function, to organise decision-making at the most relevant level. Double-linking between circles creates a network of effective communication and accountability. Feedback and continuous improvement are central to the system, allowing organisations to evolve and adapt over time. Details on how these principles are put in practice are explained below.

Circles of 4-8 people

- semi-autonomous self-organised groups of people with a common work objective (each circle has a specific domain)
- Specific roles: leader, facilitator, secretary, delegate, operational roles

Double-linking

- Specific members participate in more than one circle (leader: top-down connection, delegate: bottom-up connection)
- General circle: include leaders of all other circles
- Mission or Wisdom circle: keep an eye on the overall mission and purpose of the organisation

Consent-based decision-making: Actively looking for objections as those indicate if an option is not safe enough to try; moving away from preference to tolerance. Major steps of making a decision:

- **Understand**: Diving into the problem, discovering the context, collecting background information on the issue
- **Explore**: Defining the policy scope, exploring and synthesising proposals to address the issue
- **Consent**: Share the proposal, then everyone in the circle has to indicate whether they support, accept but have questions, or object the proposal. In case there are objections, objections have to be reasoned and accepted by the circle, then the proposal must be revised accordingly (but if the circle does not approve the objection, the proposal can go on). Decision is made if the proposal is modified in a way that accommodates objections (so no further objections raised).

Widely applied in businesses, nonprofits, and communities, sociocracy has been praised for promoting creativity, innovation, and equality while enhancing organisational effectiveness (see e.g. Eckstein, 2016; Owen and Buck, 2020; King and Griffin, 2024). Sociocracy works well:

- when the stakeholders are committed to participatory processes and open communication,
- in long-term projects where trust and iterative feedback are essential,
- in contexts where there's a willingness to experiment with new governance methods.

Sociocracy has its merits and benefits, but it might not work well:

- in highly hierarchical or rigidly structured environments,
- when there's an immediate need for quick, decisive action (e.g. in the fast request process),
- when stakeholders are unwilling to invest time in learning and adapting to sociocratic methods and democratic decision-making.

Since the science service will operate at the boundaries of two strongly hierarchical systems with relatively slow rate of adaptation (i.e., policy-making and science), sociocratic principles might not be easy to apply from the onset. Instead, adopting certain sociocratic principles (e.g., consent-based decision-making and structured feedback loops) while retaining some traditional (hierarchical) governance mechanisms might be more effective. In such a hybrid model, key decisions and actions are carried out in a sociocratic manner (i.e. deciding on strategic directions, providing capacity development or organising public engagement around a topic), while more hierarchical structures and formalised rules are in place to ensure the legitimacy and the timeliness of formal procedures (e.g. answering requests). Such predefined and tested rules of procedures are especially crucial when the SSBD needs to react quickly to policy needs or changing contextual factors.

Considering the main findings of the empirical analysis – and especially the expectations towards the Science Service – integrating some sociocratic principles into the governance model of the SSBD offers solutions for several questions raised by key informants:

1. **Inclusive Decision-Making**: External research participants and consortium members equally emphasised the importance of consultation to understand the wider context, gain diverse perspectives, acquire more knowledge, and challenge assumptions. These principles align with the sociocratic focus on mandatory consultations and inclusive discussions, ensuring decisions are made collaboratively and with a comprehensive understanding. (c.f. the *Equity and Inclusion* core value of the SSBD Ethical Infrastructure)
2. **Neutral Facilitation**: Neutral facilitation was recognised in design thinking workshops as crucial for fair discussions. Sociocracy provides structured, role-based governance, including neutral facilitators, to ensure balanced and equitable participation. (c.f. the *Equity and Inclusion* core values of the Ethical Infrastructure)
3. **Structured Feedback Loops**: Consortium members expressed the need for distributed power and structured mechanisms, such as consent-based decision-making, to ensure accountability and ethical oversight. Sociocracy's circular feedback processes and clear delegation of responsibilities support these requirements, creating transparent and adaptable governance. (c.f. *Sustainability through Transformative Change* and *Accountability* are core values of the Ethical Infrastructure)
4. **Motivating Engagement**: The design thinking workshops revealed concerns about expert motivation and the balance between effort, reward, and trust. Sociocracy emphasises transparency, shared ownership, and equitable participation, which can foster trust and incentivise involvement. *(c.f. Accountability* is a core value of the Ethical Infrastructure*)*
5. **Trust and Collaboration:** Trust and iterative feedback were considered essential in key expert interviews. Sociocracy's structured feedback loops and consent-based decision-making ensure transparency, equitable participation, and stronger agreements, building trust among stakeholders. Participatory engagement methods, such as bringing policymakers to the field, stakeholder games (e.g., role-playing exercises), and policy-pairing schemes, were identified as potential tools to foster collaboration and learn about each other's values and worldviews. Highlighting case studies that show how successful knowledge co-production efforts in the SSBD (and in other SPSIs) led to real-world policy impacts could also be a great tool that not only builds trust among stakeholders but also motivates expert participation. These methods align with sociocracy's emphasis on inclusivity and iterative learning, ensuring that diverse voices are integrated into the SSBD's governance. (c.f. the *Equity and Inclusion* core value of the Ethical Infrastructure)

The next section offers different governance structures to operationalise sociocratic principles for the science service.

5.2. A hybrid governance model for the SSBD

Based on all the information harvested in the previous phases of the co-design process, several different organisational structures were drafted and discussed internally within the consortium. In this and the next section, we outline and compare the most robust prototypes, and then we present the one which was concluded as a consent-based option. To design the governance model of the SSBD, we considered the following starting points:

- Functions to fulfil: answering requests (incl. methodological support); creating and supporting active thematic requests (incl. capacity development); transforming processes within and between Science and Policy (incl. horizon scanning, BD mainstreaming, feedback to policy) (see more in D4.2);
- Ethical considerations: Scientific integrity, Equity and inclusion, Sustainability through transformative change, Accountability, Relationality and conviviality;
- Stakeholders' expectations and practical requirements: be trustful, inclusive and robust, be agile, avoid duplication, use existing structures as much as possible, be operational and manageable.

The hybrid governance model, outlined here, offers a transparent, accountable and robust approach to manage science-policy-society interactions within the SSBD through established and tested rules of procedures and hierarchical structures; while at the same time enables co-production, addresses power imbalances, and fosters inclusive and agile processes by applying sociocratic principles. Table 6 lists the potential governance bodies, highlighting some options for flexibility (i.e., splitting up into smaller units or merging into larger ones), while Figures 5 and 6 offer visualisations for a smaller, compact governance model and a larger, all-encompassing model, respectively.

The common points in all these variations are how the different organisational units collaborate and how decisions are made. Following the principles of sociocracy, the main governance bodies are represented as circles. Operative work is carried out by management teams including a) paid coordinators who are employed by the operative management body and offer day-to-day management support, and b) unpaid voluntary experts who are recruited from topical networks, selected to represent gender, age, geographical and disciplinary diversity, and serve for a fixed term. Each operative circle selects one representative from its members to take part in the meetings of the Strategic Advisory Board, which is responsible for ensuring the policy relevance and contributing to forecasting and anticipating the future tasks of the SSBD. Thus, the circle of the Strategic Advisors is composed of the representatives of the operative circles, as well as of the representatives of key stakeholders of the SSBD (e.g., DGs, strategic partners like Biodiversa+ and Alternet, or other science-policy-society interfaces like Eklipse and IPBES). Decisions can be made on two different ways:

- Simple operative decisions which require timely reaction are based on established rules of procedures (e.g. managing an incoming policy request or recruiting a new expert group should follow the guidance which has been developed and tested by BioAgora).
- Complex strategic decisions, which might entail ethical issues (e.g. future directions to take by the SSBD, public deliberation launched on a certain topic etc.), are based on consent, meaning that a decision is accepted if nobody in the given circle has a reasonable objection (i.e., the proposed solution is considered "safe enough to try"). Consent based decisions usually follow the steps of: understanding the situation, presenting a proposal, discussing pros and cons (clarifying the proposal), briefing a response and checking for potential objections, if objections emerge, check if those objections are shared by others, and if so, redesign the proposal to resolve the objections.

Table 6: Potential governance bodies of the SSBD

Tentative name	Main role / activities	Composition	Does it fulfil a specific need?
Strategic Advisory Body	• Regular feedback between policy-making and the SSBD • Strategic planning – research prioritisation and 5-year roadmap development (foreseeing new requests, defining new directions) • Meets every quarter (or at least twice a year)	• ARMT delegate • TCMT delegate • Knowledge Agora coordinator • Key partners' delegates, e.g.: DG ENV, DG Research, JRC, Biodiversa+, Eklipse, EEA, • members serve 3-year terms	The Strategic Advisors (or Mission Circle, as often called in sociocratic literature) of the SSBD could act as a co-productive space between policymakers and diverse knowledge holders deploying the basic principles of sociocracy. Permanent and regular engagement with policy actors can enable the production of policy-relevant knowledge and thus greater policy up-take. It can also build trust among actors, enable joint strategic planning in terms of new research directions, respond to ad hoc needs in a flexible manner, and perhaps most importantly, create a culture of participation and joint decision-making, incorporating results and insights from other functions of the SSBD, such as the TCMT, ARMT, and BKA.
Transformative Change Management Team (TCMT)	• Overall, it supports expert groups and all other SSBD units to carry out their work in a transformative manner • Ethical guidance and review • Methodological support on knowledge synthesis and engagement • Capacity development, if needed	• Coordinator (paid staff of operative body) • Societal champion (honorary paid) • 6 additional voluntary members of diverse expertise (ethics, engagement, methodology) • one member elected as TCMT delegate to mission circle • members serve 3-year terms	Acting as an engine to spur capacity building and embedding transformative practices across SSBD units. The inclusion of diverse perspectives in the SPSI underpins the transformative potential of the SSBD. Thus, the TCMT could incorporate experts of diverse backgrounds and experiences (e.g. indigenous and local stakeholders, societal actors, early-career researchers, youth groups, marginalised groups, etc.) in its various tasks such as methodological development, ethical infrastructure, and engagement processes. *As TCMT integrates several functions, if resources allow it can be split into smaller units (e.g. Ethics Committee, Method Support Team)*

Answering Request Management Team (ARMT)	• Managing the answering request process according to existing protocols • ARMT members = focal points for requests and small support team for coordinator and co-coordinator (2-4 people) • coordinator and co-coordinator provide technical support (i.e. meeting organisation, communicating through platform, final outlay of reports)	• 2 co-coordinators (paid staff of operative body) • 7-9 additional voluntary members of diverse disciplinary background and embedded in different topical networks • one member elected as ARMT delegate to mission circle • members serve 3-year terms	Integrating co-production practices while balancing efficiency. While the request answering process may require faster processing and action from all stakeholders involved, there are certain steps where a sociocratic process can be deployed for co-production. For instance, during the scoping phase when the knowledge request can be reformulated, and/or during the post-phase of answering the request when the produced knowledge will have to be transformed into policy decisions. Co-productive and inclusive processes at these stages can foster the adoption of scientific results in biodiversity-related decisions.
Biodiversity Knowledge Agora Management Team (BKA)	• Knowledge Agora is the sum of engaged topical networks but not an independent unit in itself • Coordinator in tandem with ECR link up with topical networks and manage the platform to ensure information flow, capacity development, participation in events, etc.	• coordinator (paid staff of secretariat) • ECR (yearly scholarship provided)	Ensuring that all relevant stakeholders – including marginalised knowledge holders, NGOs, ECRs, and the public – are represented, a BKA coordinator liaises with existing topical networks. This governance model hypothesises that topical networks in most thematic areas already exist (or will be established during the project period), therefore over the long term the BKA's role is more about coordination / orchestration than actual creation and facilitation of topical networks. *As networks are crucial for the operation of the SSBD and enables the quick reaction to requests, if resources allow, it can be organised as a whole unit instead of a coordinator.*
Operative body	• administrative and technical support to all the SSBD functions	• coordinators of TCMT, ARMT and Knowledge Agora (paid staff)	

	• day-to-day management and communication • agile operations (the paid staff can replace each other when needed)	• ECR hired through yearly scholarships	
Expert groups	• Answering requests according to existing protocol • Participating in horizon scanning / research prioritisation	• Voluntary experts recruited from topical networks and research projects • Serving until the request is responded	Expert groups gather on purpose for a definite period of time, to carry out a specific task (i.e. answering a request), so they act as temporary units of the SSBD. Expert groups should be diverse in terms of knowledge system, disciplinarity, gender, age and geography.
Yearly assembly with EUBP	• Serves as a face-to-face platform where experts of the SSBD can meet with policy-makers • Yearly meetings where main results of expert groups presented, possibility for policy uptake discussed, etc. • Can be a motivational factor for participating experts	As it is established, plus invited people from expert groups, TCMT and ARMT	Several existing policy processes and institutions maintain a strictly hierarchical structure where decision-making follows a more traditional vertical approach. In the SSBD, instead of a formal General Assembly, a close link to the EUBP could be developed as a more traditional SPSI format. Regular meetings (once or twice a year) would enable that research results from the SSBD are delivered to EU and national level policy-makers, and possible pathways for policy-uptake are identified together. Additionally, this could also serve as a motivational factor for knowledge holders to participate in the SSBD, as the close link to EUBP would allow experts to present their work in front of high-level political actors. The meaningful inclusion of policymakers in the knowledge co-production process itself is, however, identified as a critical element in transformative SPSIs.
Knowledge Exchange Networks	Key connections but outside of the SSBD's organisational structure	• Project clusters built by BioAgora • Existing networks	KENs are crucial to provide expertise for all functions of the SSBD, but they are not internal part of it. They connect to the SSBD through the BKA coordinator.

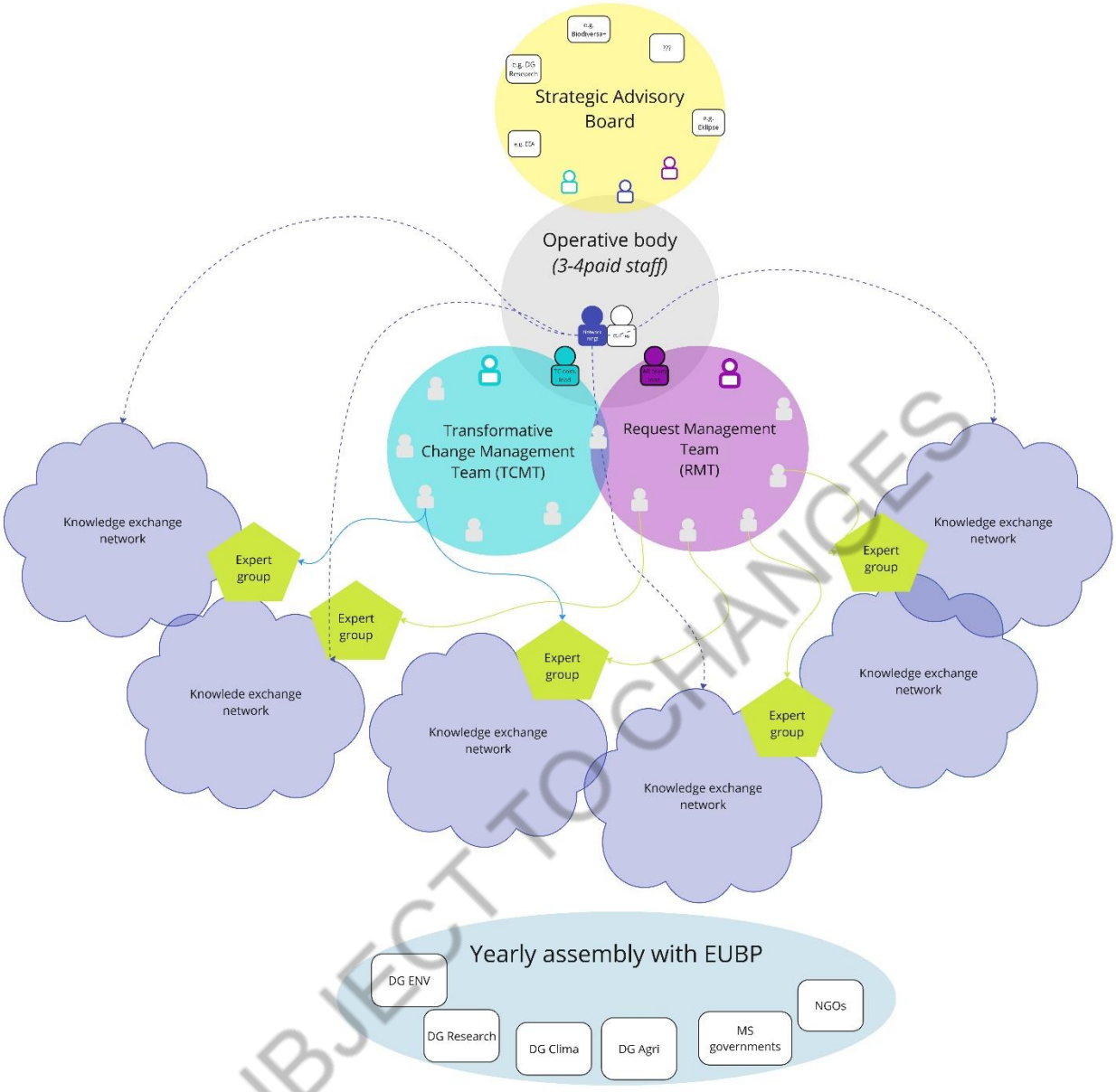

Figure 5: A compact governance model for the SSBD

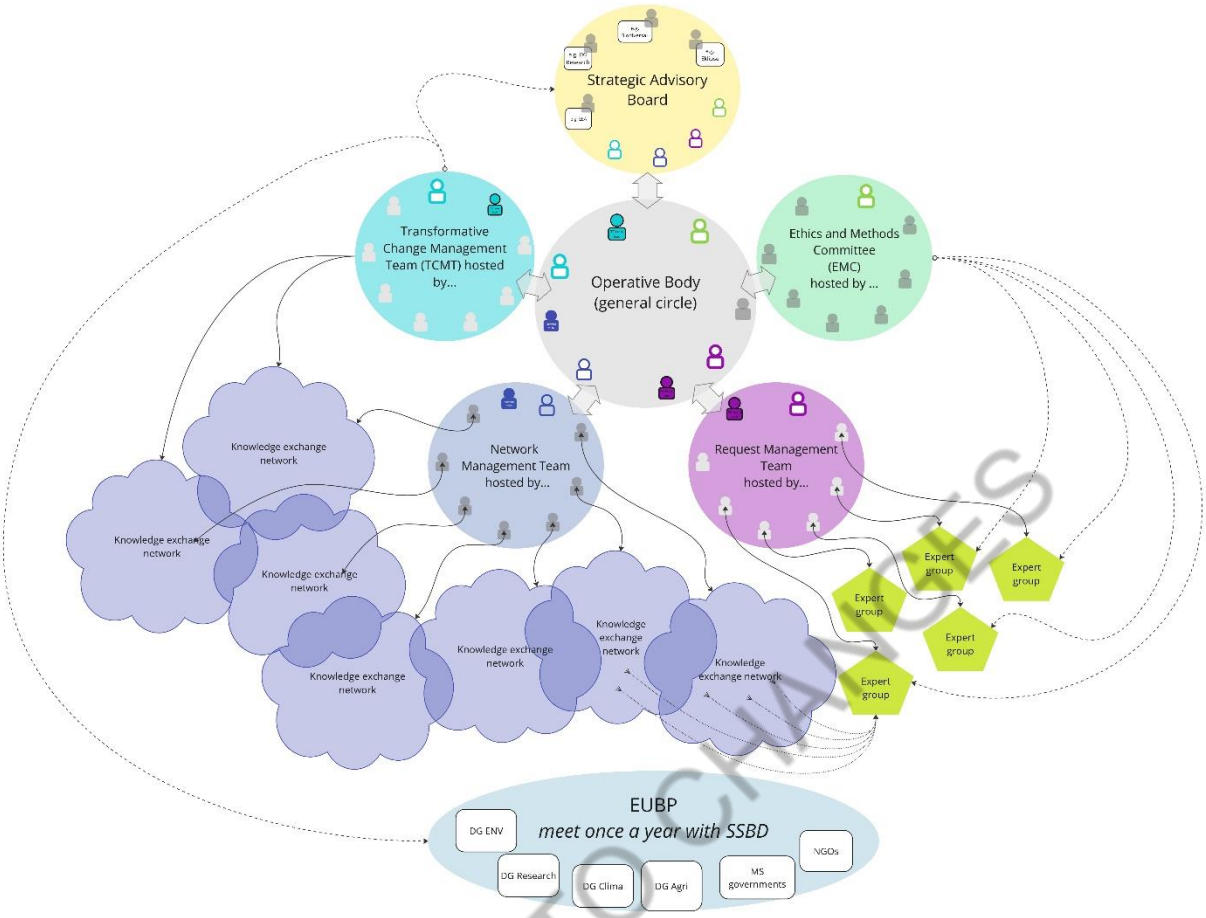

Figure 6: An all-encompassing governance model for the SSBD

How can these hybrid models bring the SSBD functions to life?

Answering requests and build up evidence base:

- **Building up evidence and knowledge base on the topic**: the evidence and knowledge base is built by BioAgora, the task for the SSBD is to regularly update the databases, which should be the task of the Operative Body (3 paid staff), while the operation of the platform could be outsourced to a contractor (e.g. OPPLA)
- **Answering requests:** Answering request management body (processes and internal structures, incl. roles of the different actors, are developed by the ARTF)

Creating and supporting active thematic networks:

- **Link up with Biodiversity Commitments:** connecting scientific research and evidence with existing biodiversity policy commitments and targets at various levels - particularly the EU Biodiversity Strategy for 2030.
- **Building knowledge exchange networks:** topical networks are key for the SSBD as collaborators but not (internal) parts of the organisational structure. Assuming that the SSBD will work together with topical networks which are already established (or getting organised under BioAgora), the focus here is more on

coordinating across (rather than building) topical networks. Reaching out to topical networks, ensuring communication and participation is the role of the BKA coordinator (member of the Operative Body).

- **Capacity building for topical networks**: a large part of capacity building will be offered in a systematic way (i.e. internal training material developed by BioAgora to support the onboarding of experts, collection of available training opportunities also made available online through the platform, etc.). Still, ad hoc capacity development needs might emerge both on behalf of the topical networks or from the policy side. These ad hoc capacity development needs can be fulfilled by the Transformative Change Management Team whose members should include educational / training experts. It might also happen that a very specific capacity need emerges (e.g. a knowledge overview process highlights a gap in capacities, or a requester asks at the end of a request process for additional trainings). In this case, a training request can also be submitted to the SSBD, which will be responded through the regular procedures of the Answering Request Management Team.

Transforming processes within and between Science and Policy:

- **Horizon scanning and research prioritisation:** the yearly assemblies with the EUBP, as well as the inclusion of high-level policy bodies in the Strategic Advisors allows that policy priorities are integrated into the SSBD's workplan. To ensure the policy relevance of the SSBD's work, the Operative Body creates and regularly revises (together with the Strategic Advisors) a 5-year roadmap (i.e., research prioritisation) which also helps anticipate incoming requests.
- **Support biodiversity mainstreaming:** since the EUBP includes representatives of various DGs, the yearly assembly with EUBP enables that biodiversity related information is shared across sectors. Another opportunity is to open the ticketing system (AR management team) to submission from any DGs.
- **Feedback to policy frameworks:** during the answering request process expert groups meet regularly with the requester, therefore there is an opportunity of directly influencing policy-making. In addition, the yearly assembly with the EUBP ensures that outputs of the SSBD are shared with national and EU-level policy-makers. A more fundamental option to giving feedback to policy frameworks would be if the SSBD workplan (prepared by the Operative Body together with the Strategic Advisors) would be if an impact assessment is done when the 5-years roadmap of the SSBD is developed. This would not require an additional body, but the development of procedures.

5.3. Comparing three different governance options

In the above section we differentiated between governance options according to how large and complex the organisation could be. In addition to the size and complexity of the organisation, another key consideration is the legal personhood, i.e. if the SSBD is an independent body, or if it is hosted by another – or several other – organisation(s). Table 7 compares three plausible options by using a SWOT analysis: 1) a small and compact SSBD which is hosted by an EU institution (e.g. the JRC's Knowledge Centre for Biodiversity), 2) a small and compact SSBD which is independently managed as a new legal person, 3) a large, all-encompassing SSBD whose organisational units are hosted by different, already existing partner organisations.

Table 7: Comparing different options to host the SSBD using a SWOT analysis

	A compact SSBD is hosted by KCBD	A compact SSBD is hosted by an independent organisation	An all-encompassing SSBD hosted by different organisations
Strengths	• Small and resource efficient • Well-embedded into policy • Central functions can directly be financed by EC • Sociocratic circles enable transparent (and independent) decision-making	• Small and resource efficient • Fully independent from political decision-making • Sociocratic circles enable transparent (and independent) decision-making	• Resources of existing organisation in the field are mobilised • Each function can operate as a separate body • Independence of decision-making is ensured through the shared organisational structure
Weaknesses	• Non-independent from policy-making • Since some functions are merged, certain activities might become marginal	• Financial vulnerability • Since some functions are merged, certain activities might become marginal • Conflicts of interest might emerge depending on the institution hosting the SSBD. • Establishing a new legal person takes time and admin burdens	• Shared organisational structure can lead to fragmentation • Difficult to create a joint vision across the different organisations involved • Difficult to identify clear responsibilities • Difficult to coordinate across the activities of different organisations • Unclear legal background
Opportunities	Can contribute to a transformation from within	Can strengthen the position of scientific actors	• Can strengthen the whole field through concerted action • Can reduce duplication and increase resource efficiency
Threats	• Lack of independence might lead to limitations of certain functions	• Lack of formal policy embeddedness might limit policy impact • Lack of formal policy embeddedness might	• If research budget will decrease in general, competition might replace collaboration

	• Lack of independence might alienate some of the researchers • If political priorities change, budget might be cut • Too small organisation to manage a large number of requests	make the SSBD look like as an additional player with no power in the field • Too small organisation to manage a large number of requests	across the involved organisations • Can be easily hijacked by one of the partner organisations in case of power imbalances or different levels of ambition

Based on the SWOT analysis and follow-up discussions within the consortium and with EC colleagues, the first option has been chosen as the most viable governance model for the SSBD.

6. The proposed governance model of the SSBD

The three-year co-design process presented in this report concluded in a proposed compact governance model including three circles as its main permanent bodies (Figure 7). Compared to the previous prototypes, it has both some advantages and hindrances, and implementing this model will come with trade-offs, especially in terms of ethical issues (see the results of a quick ethical assessment of this model in Annex D). It is important to note that while this model was agreed upon as a consent-based option, it is still coarse-grained, and its organisational units need further testing and careful formalisation of internal procedures. This detailed work of bringing the structure to life will be done primarily by the BioAgora task forces working on the three main functions (Answering Request Task Force, Knowledge Agora Task Force, and Transformative Change Task Force).

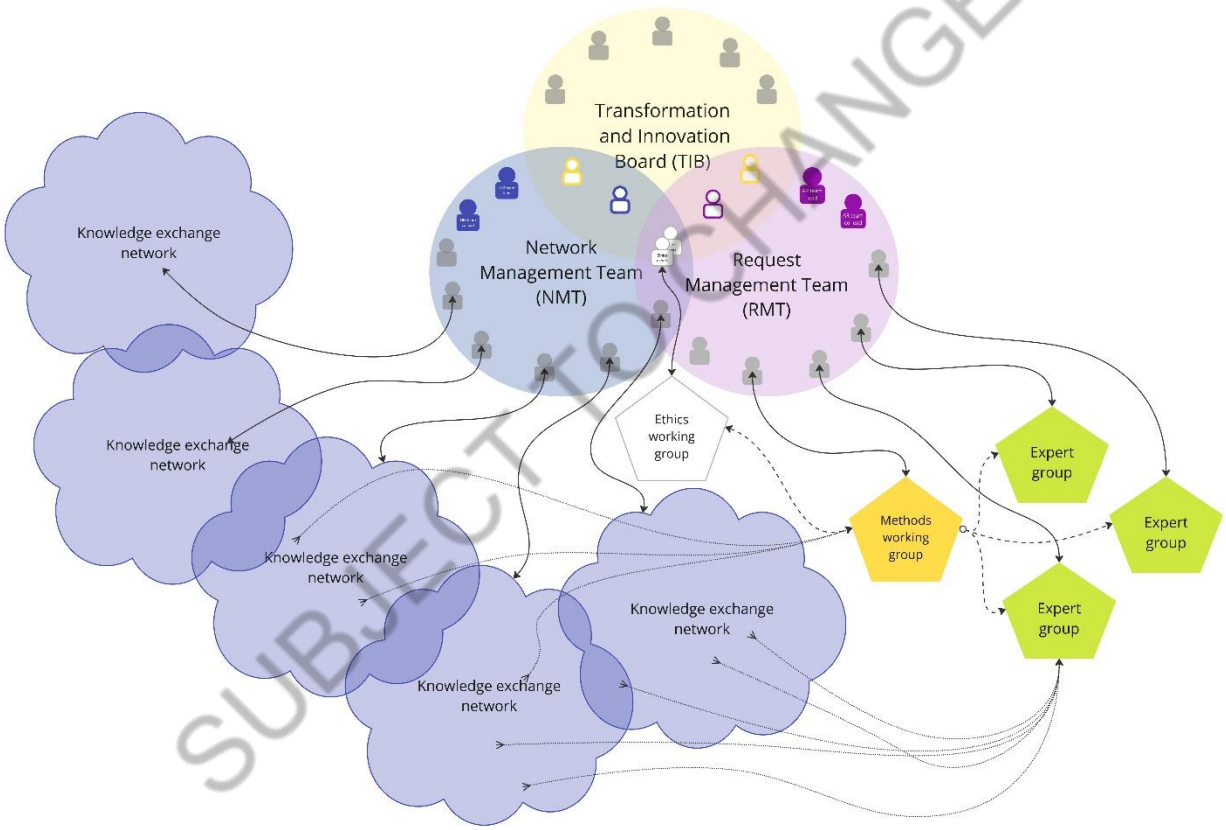

Figure 7.: The proposed future governance of the Science Service for Biodiversity

Permanent bodies of the future SSBD:

- Transformation and Innovation Board (TIB):
    - Its main objective is to ensure the transformative potential of the SSBD by linking SSBD activities to policy priorities, anticipating policy relevant topics (future requests), and supporting mainstreaming.
    - It is composed of 8-12 members, including:
        - 1 representative of the Network Management Team
        - 1 representative of the Request Management Team
        - ethics experts

        - 5-9 representatives of key partner organisations (including for instance Biodiversa+, Eklipse, DGs of the European Commission, or NGOs – who these key stakeholders are shall be decided by the Knowledge Agora Task Force).
    - Members are recruited through an open call among partner organisations and serve for 3 years. Representatives of the NMT and RMT, as well as the ethics experts, always have a seat at the table (i.e., the person might change, but the position continued to be represented in the TIB).
    - It meets 2-4 times per year, and strategic decisions follow a consent-based procedure (no veto power, but reasoned consent must be incorporated in the revised proposal before a decision is taken).
    - Its main activities / roles:
        - Preparing a yearly roadmap for the SSBD (anticipating new requests and ensuring the policy relevance of the SSBD)
        - Reaching out to policy decision-makers in other sectors and at different spatial scales (mainstreaming)
- Network Management Team (NMT)
    - Its main objective is to facilitate the knowledge exchange networks of the SSBD through which experts participating in its permanent and temporary bodies can be recruited and knowledge needs can be fulfilled. Horizon project Clusters will form a core of KENs when possible, and NMT will manage the clustering activities.
    - It is composed of 8-12 members, including:
        - at least 2 co-coordinators who deal with day-to-day management (internal and external communication, event organisation, capacity development, maintenance of databases, etc.)
        - ethics experts
        - 5-9 representatives of knowledge exchange networks, including EU project clusters, or already existing scientific societies
        - One of the members acts as a delegate to the Transformative and Innovation Board.
    - Members serve for 3 years; afterwards new members are recruited through an open call among knowledge exchange networks. Selection of representatives should follow diversity and inclusion principles to allow a balanced representation across gender, age, geographical and disciplinary background.
    - Day-to-day management and operative decisions are made on the basis of pre-established rules of procedures, while strategic decisions (e.g., establishing a new Knowledge Exchange Network) should follow the process of consent-based decision-making.
    - The NMT can consult the Method Working Group if methodological support is needed for answering a specific request.
    - Its main activities / roles:
        - Communication with collaborating networks
        - Facilitation and coordination of networking activities (e.g., establishment of new project clusters or management of nascent networks)
        - Capacity development and event organisation (e.g., trainings, or special sessions at conferences)
- Request Management Team (RMT)
    - Its main objective is to manage knowledge requests from the pre-submission dialogue to the dissemination of the results and the internal evaluation of the process.
    - It is composed of 8-12 members, including:
        - 2 co-coordinators who deal with day-to-day management (internal and external communication, event organisation, capacity development, maintenance of databases, overseeing the work of focal points, etc.)
        - 1 societal champion, a non-scientific knowledge holder who ensures that requests are answered in a way that also reflects the broader societal priorities

        - 1 ethics expert
        - 6-8 focal points, experts recruited through EU-research projects or more from the Knowledge Exchange Networks, who take responsibility for the coordination of specific requests and are acknowledged in all processes they lead on.
    - Members serve for 3 years; afterwards new members are recruited through an open call across the knowledge exchange networks.
    - Day-to-day management and operative decisions are made on the basis of pre-established rules of procedures (i.e., the request management procedure established and tested by BioAgora). However, certain more strategic decisions (e.g., running a public deliberation on a certain topic) should follow the process of consent-based decision-making.
    - The RMT can consult the Method Working Group if methodological support is needed for answering a specific request.
    - Its main activities / roles:
        - Manage urgent and in-depth requests
- Ethics experts
    - At least two voluntary experts are recruited from knowledge exchange networks for a 3-year period with the objective of ensuring the ethical compliance and transparency of SSBD activities.
    - These ethics experts act in the intersection of the three permanent circles and can be consulted by any of those if ethical risks emerge.
    - These ethics experts can convene the Ethics Working group if ethical risks emerge which require special expertise and extra resources to resolve.

Temporary bodies of the future SSBD:

- Expert groups:
    - Their main objective is to carry out a specific task in a predefined period of time (i.e., to answer a request, or to organise a capacity development event, etc.)
    - Expert groups are temporary and are composed of voluntary experts who are recruited through the knowledge exchange networks either by directly contacting certain projects or organisations, or by launching open calls for experts. Expert groups should be balanced according to age, gender, and disciplinary background.
    - Members serve for a predefined period of time (typically between 3 months to 1.5 years, depending on the type of activity they are tasked with).
    - The work of the expert groups is facilitated by a focal point (member of the RMT or the NMT).
- Method expert group:
    - The same as above, with the exception that the Method expert group deals solely with methodological issues – i.e., they provide methodological support to thematic expert groups.
- Ethics expert group:
    - The same as above, with the exception that the Ethics expert group deals solely with ethical issues – i.e., they provide ethical support to the permanent bodies of the SSBD or to thematic expert groups, and they carry out an ethical assessment regularly to ensure the transparency of the SSBD.
- Knowledge exchange networks:
    - They bring together knowledge providers and knowledge users around a specific topic, and thus they are key to recruit experts to fulfil the different functions of the SSBD. They can operate in different forms:
        - Knowledge Exchange Networks established by BioAgora
        - Clusters of EU-funded projects
        - Already existing networks (e.g. learned societies)
    - They are connected to the SSBD through the NMT but not part of its internal governance.

References

Banta, D. (2003). The development of health technology assessment. *Health Policy*. 2003 Feb;63(2):121-32. doi: 10.1016/s0168-8510(02)00059-3. PMID: 12543525.

Banta, D & Jonsson, E. (2009). History of HTA: Introduction. *International Journal of Technology Assessment in Health Care.* 25(S1):1-6. doi:10.1017/S0266462309090321

Barbrook-Johnson, P. & Penn, A. S. (2022). *System Mapping - How to Build and Use Causal Models of Systems*. p186, Palgrave Macmillan Cham. https://doi.org/10.1007/978-3-031-01919-7

Bednarek, A.T., Wyborn, C., Cvitanovic, C., Meyer, R., Colvin, R.M., Addison, P.F., Close, S.L., Curran, K., Farooque, M., Goldman, E. & Hart, D., (2018). Boundary spanning at the science–policy interface: the practitioners' perspectives. *Sustainability Science*, 13(4), pp.1175-1183.

Belaïd, F. & Unger, C. (2024). Crafting effective climate, energy, and environmental policy: time for action. *Humanities and Social Sciences Communications*, *11*(1), 1-5.

Berg, M. & Lidskog, R. (2024). Global environmental assessments and transformative change: the role of epistemic infrastructures and the inclusion of social sciences. *Innovation: The European Journal of Social Science Research*, 1-18.

Czekaj, J., Walczak, M. & Ziebicki, B. (2020). Towards the sociocratic organization model. *Przegląd Organizacji*, 10, 13-19.

DesignCouncil (2019). What is the framework for innovation? Design Council's evolved Double Diamond. https://www.designcouncil.org.uk/news-opinion/what-framework-innovationdesign-councils-evolved-double-diamond

Eckstein, J. (2016). Sociocracy: An Organization Model for Large-Scale Agile Development. *Proceedings of the Scientific Workshop Proceedings of XP2016 (XP '16 Workshops)*. Association for Computing Machinery, New York, NY, USA, Article 6, 1–5. https://doi.org/10.1145/2962695.2962701

Funtowicz, S.O. & Ravetz, J.R. (1993). Science for the post-normal age. *Futures*, 25(7), pp.739-755.

Gordon, I., Lewis, J. & Young, K. (1993). Perspectives on policy analysis. in: Hill, Michael (ed) *The policy process: a reader*, pp.: 5-9.

Görg, C., Wittmer, H., Carter, C., Turnhout, E., Vandewalle, M., Schindler, S., ... & Lux, A. (2016). Governance options for science–policy interfaces on biodiversity and ecosystem services: comparing a network versus a platform approach. *Biodiversity and Conservation*, *25*, 1235-1252.

Heink, U., Marquard, E., Heubach, K., Jax, K., Kugel, C., Neßhöver, C., ... & Vandewalle, M. (2015). Conceptualizing credibility, relevance and legitimacy for evaluating the effectiveness of science–policy interfaces: challenges and opportunities. *Science and Public Policy*, *42*(5), 676-689.

Horcea-Milcu, A. I., Dorresteijn, I., Leventon, J., Stojanovic, M., Lam, D. P., Lang, D. J., ... & Zimmermann, S. (2024). Transformative research for sustainability: Characteristics, tensions, and moving forward. *Global Sustainability*, *7*, e14.

Jagannathan, K., Emmanuel, G., Arnott, J., Mach, K. J., Bamzai-Dodson, A., Goodrich, K., ... & Klenk, N. (2023). A research agenda for the science of actionable knowledge: Drawing from a review of the most misguided to the most enlightened claims in the science-policy interface literature. *Environmental science & policy*, *144*, 174-186.

JRC (n.d.): *Mission statement and work programme*. https://joint-research-centre.ec.europa.eu/jrc-mission-statement-work-programme_en

Kaló, Z., Gheorghe, A., Huic, M., Csanádi, M. & Kristensen F. B. (2016). "HTA Implementation Roadmap in Central and Eastern European Countries." *Health Economics* 25 (February): 179–92. doi:10.1002/hec.3298.

Kelemen, E., Pataki, G., Konstantinou, Z., Varumo, L., Paloniemi, R., Pereira, T. R., ... & Young, J. (2021). Networks at the science-policy-interface: challenges, opportunities and the viability of the 'network-of-networks' approach. *Environmental Science & Policy*, *123*, 91-98.

Khoury, M., Jaouen, A. & Sammut, S. (2024). The liberated firm: An integrative approach involving sociocracy, holacracy, spaghetti organization, management 3.0 and teal organization, *Scandinavian Journal of Management* 40(1). https://doi.org/10.1016/j.scaman.2023.101312.

King, D., & Griffin, M. (2024). Governing for the common good: the possibilities of sociocracy in nonprofit organizations. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 1-12.

Lee, M. Y. & Edmondson, A., C. (2017). Self-managing organizations: Exploring the limits of less-hierarchical organizing. *Research in Organizational Behavior*, Volume 37, p. 35-58, https://doi.org/10.1016/j.riob.2017.10.002.

Löblová O. (2018). Who's afraid of institutionalizing health technology assessment (HTA)?: Interests and policy positions on HTA in the Czech Republic. *Health Econ Policy Law.* 2018 Apr;13(2):137-161. doi: 10.1017/S174413311700024X.

MacKillop, E., Quarmby, S. & Downe, J. (2020). Does knowledge brokering facilitate evidence-based policy? A review of existing knowledge and an agenda for future research. *Policy & Politics*, 48(2), 335-353. Retrieved May 3, 2025, from https://doi.org/10.1332/030557319X15740848311069

Maqdliyan, R. & Setiawan, D. (2023): Antecedents and consequences of public sector organizational innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(2). https://doi.org/10.1016/j.joitmc.2023.100042.

McGonigle, D. F., Rota Nodari, G., Phillips, R. L., Aynekulu, E., Estrada-Carmona, N., Jones, S. K., ... & Zhang, W. (2020). A knowledge brokering framework for integrated landscape management. *Frontiers in Sustainable Food Systems*, *4*, 13.

OECD (2017). *Policy Advisory Systems: Supporting Good Governance and Sound Public Decision Making*. OECD Public Governance Reviews, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264283664-en

Owen, C. (2007). Design thinking: Notes on its nature and use. *Design Research Quarterly*, 2(1), pp. 16–27.

Owen, R. L. & Buck, J. A. (2020). Creating the conditions for reflective team practices: examining sociocracy as a self-organizing governance model that promotes transformative learning. *Reflective Practice*, 21(6), 786–802. https://doi.org/10.1080/14623943.2020.1821630

Pielke, Jr, R. A. (2007). *The honest broker: making sense of science in policy and politics*. Cambridge University Press

Preiser, R. (2025). Rethinking interdisciplinary research ethics in the age of complexity and transformative change. *Journal of Interdisciplinary Ethical Research*, *1*(1), 5.

Romme, A.G.L. (1995). The sociocratic model of organizing. *Strat. Change*, 4: 209-215. https://doi.org/10.1002/jsc.4240040404

Rozance, M. A., Krosby, M., Meadow, A. M., Snover, A., Ferguson, D. B. & Owen, G. (2020). Building capacity for societally engaged climate science by transforming science training. *Environmental Research Letters*, *15*(12), 125008.

Salomaa, A. (2018). Co-production for fundamental change: a response to Sutherland et al. *Oryx* 52, (4), pp. 617-617.

Sarkki, S., Tinch, R., Niemelä, J., Heink, U., Waylen, K., Timaeus, J., ... & van den Hove, S. (2015). Adding 'iterativity'to the credibility, relevance, legitimacy: a novel scheme to highlight dynamic aspects of science–policy interfaces. *Environmental Science & Policy*, *54*, 505-512.

Sarkki, S., Young, J. C., Vandewalle, M., Heikkinen, H. I., Norum, R., Stenseke, M., ... & Wittmer, H. (2025). Transformative science–policy interfacing: the case of biodiversity and ecosystem services. *Sustainability Science*, *20*(1), 231-249.

Schell, S. & Bischof, N. (2022). Change the way of working. Ways into self-organization with the use of Holacracy: An empirical investigation. *European Management Review*, 19(1), 123–137. Available from: https://doi.org/10.1111/emre.12457

Subramanian. S.M., Kelemen, E., de Vos, A., Krause, T., Mayhew, M., Mead, A., Nuesiri, E., Perritt, J., Islar, M., Amaruzaman, S., Robles, G.A., Nakangu, B., Kosmus, M., Porter-Bolland, L., Yiu, E. & Varga, A. (2025). Inclusion in body and mind: Ensuring full participation of Indigenous peoples and local communities in decisions related to nature. *Ecology and Society,* in press.

Surowiecki, J. (2004). *The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations.* Doubleday & Co.

Sutherland, W.J., Shackelford, G. & Rose, D.C. (2017). Collaborating with communities: co-production or co-assessment?. *Oryx*, *51*(4), pp.569-570.

Szabó, M. (2014). Tudomány és közpolitika. *Politikatudományi Szemle*, (2), pp.122-136.

True, J. L., Jones, B. D. & Baumgartner, F. R. (2007). Punctuated-equilibrium theory: explaining stability and change in public policymaking. In: *Theories of the Policy Process, Second Edition* (pp. 155-187). Routledge.

Tschimmel, K. (2012). Design Thinking as an effective Toolkit for Innovation. *ISPIM conference proceedings* (p. 1). The International Society for Professional Innovation Management (ISPIM).

Turnhout, E. (2024). A better knowledge is possible: Transforming environmental science for justice and pluralism. *Environmental Science & Policy*, *155*, 103729.

Wellstead, A. M., Gofen, A. & Carter, A. (2021). Policy innovation lab scholarship: past, present, and the future–Introduction to the special issue on policy innovation labs. *Policy Design and Practice*, *4*(2), 193-211.

Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., ... & Van Kerkhoff, L. (2019). Co-producing sustainability: reordering the governance of science, policy, and practice. *Annual Review of Environment and Resources*, *44*(1), 319-346.

Young, J. C., Waylen, K. A., Sarkki, S., Albon, S., Bainbridge, I., Balian, E., ... & Watt, A. (2014). Improving the science-policy dialogue to meet the challenges of biodiversity conservation: having conversations rather than talking at one-another. *Biodiversity and Conservation*, *23*, 387-404.

Annexes

Annex 1: The governance structure of some of the interviewed organisations

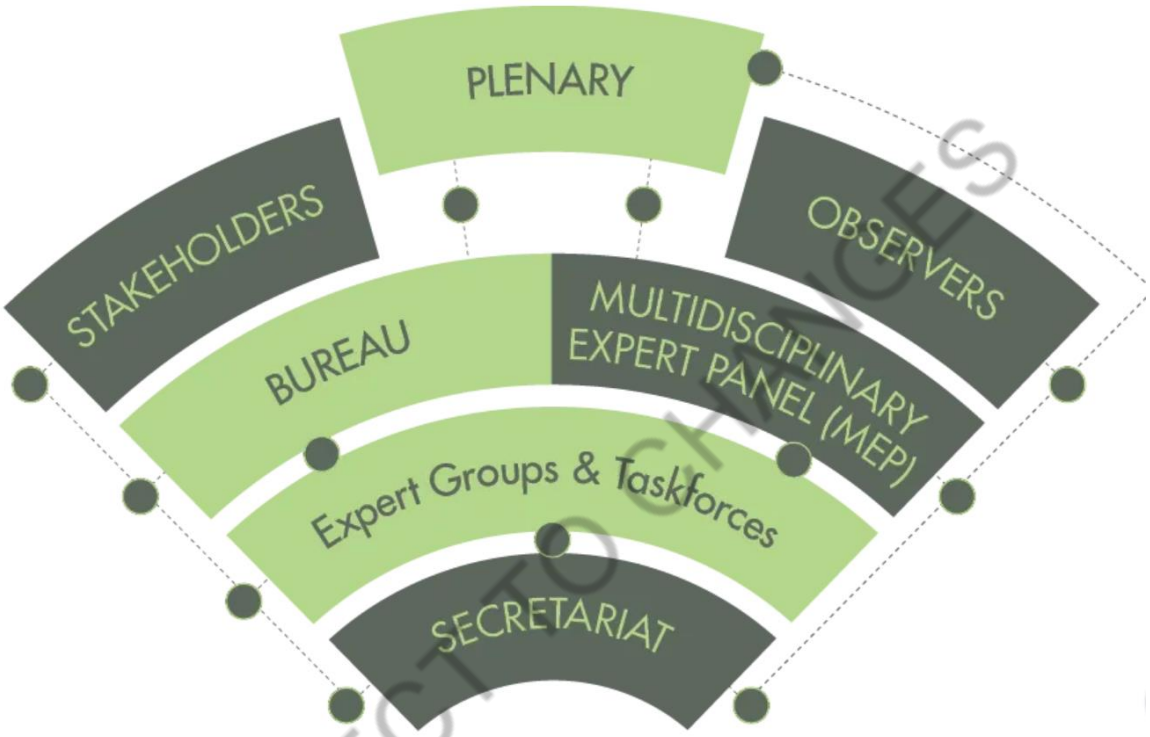

Figure 8:IPBES's governance framework

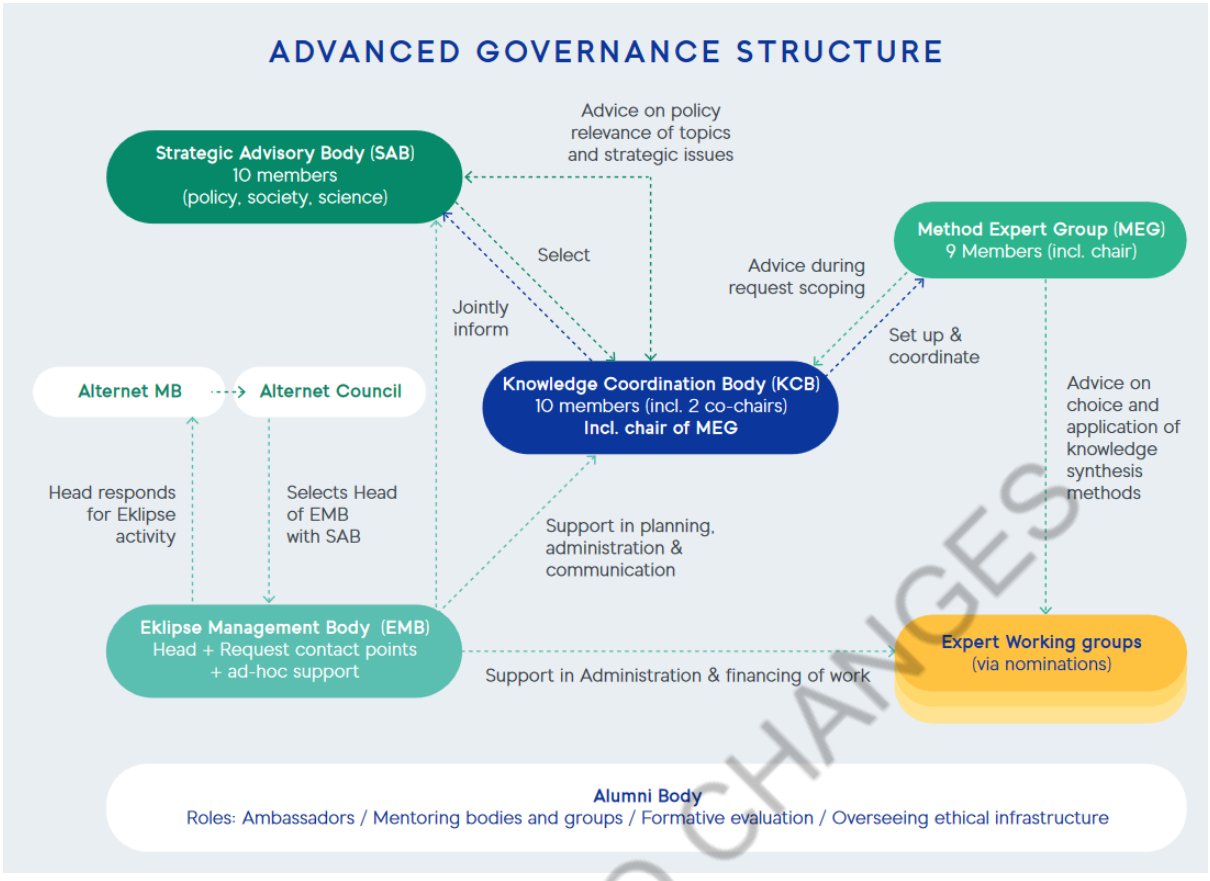

Figure 9: Eklipse's governance structure

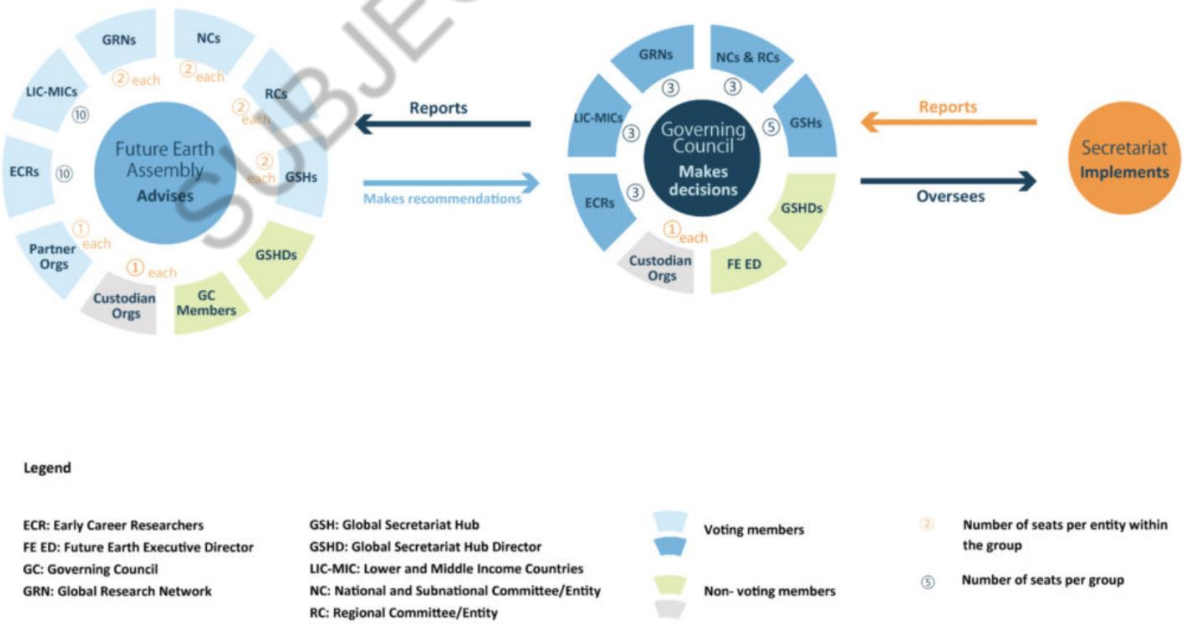

Figure 10: Future Earth's governance structure

Figure 11: Biodiversa's governance structure

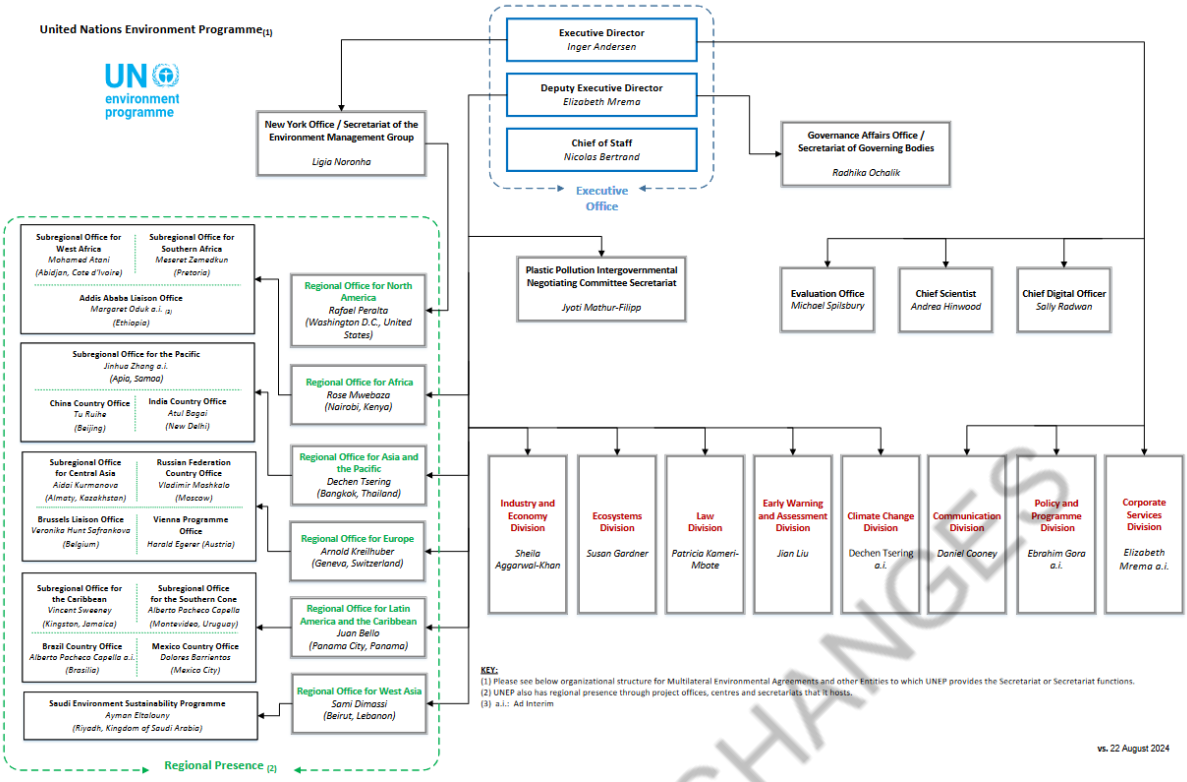

Figure 12: UNEP's governance framework

Figure 13: ICES's governance structure

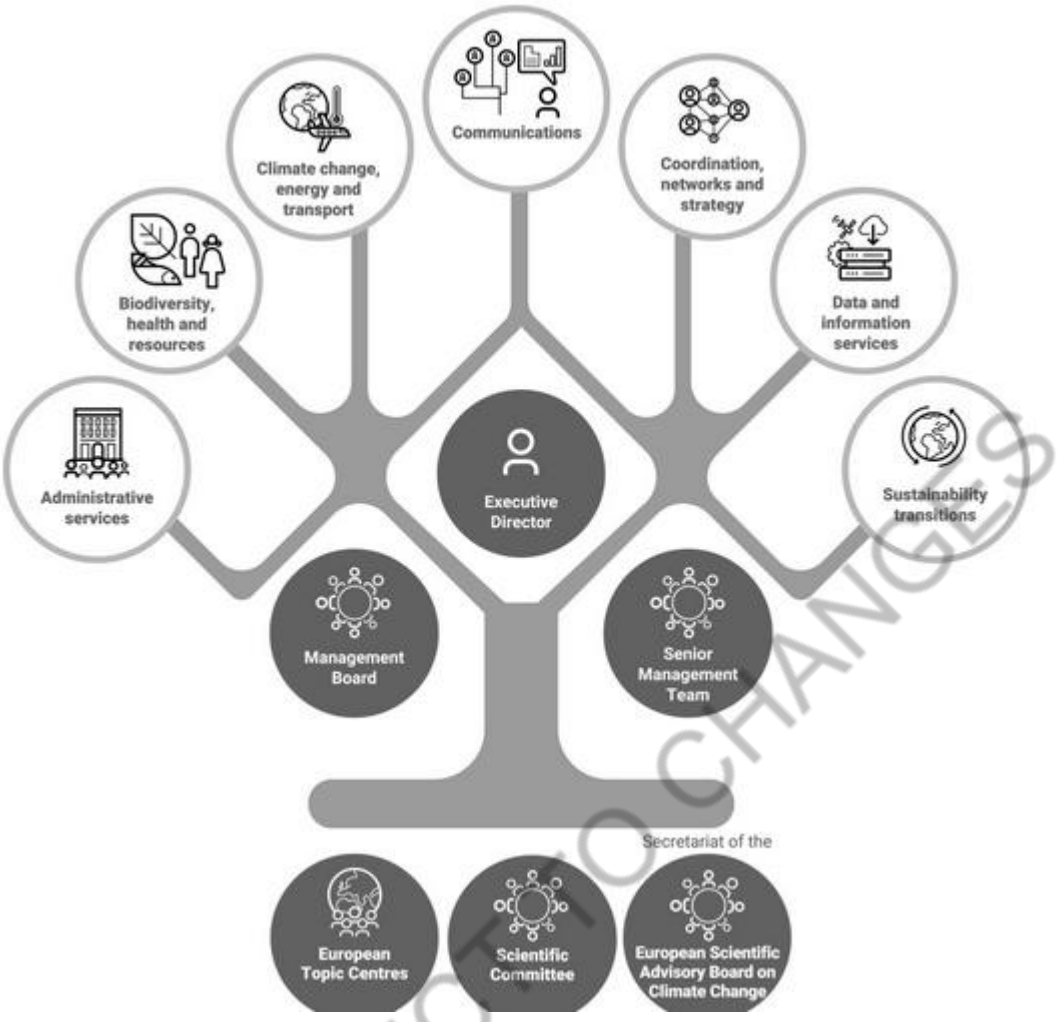

Figure 14: EEA's governance structure

The European Environment Agency is governed by a Management Board and Bureau whose members are mandated to act in the public interest. The day-to-day operation of the EEA is the responsibility of the Executive Director and the Senior Management Team. Scientific advice is provided by a Scientific Committee.

Eionet is the European Environment Agency partner network that supports the EEA work programme implementation. Together, the EEA and Eionet implement the EEA-Eionet Strategy for 2021-2030 to give EU policymakers and the public the **best available knowledge** to reach agreed environmental and sustainability targets. **Eionet Groups** work with the EEA and European Topic Centres to assess Europe's environment and climate, and any related impacts on health and ecosystems. Country experts are designated to be members of Eionet Groups, where they share their expertise to develop actionable knowledge in different work areas.

European Topic Centres (ETCs) are thematic expertise centres contracted and funded by the EEA for tasks identified in the EEA-Eionet Strategy. These are designated by the EEA Management Board following a European-wide competitive selection process. ETCs support the EEA in the **processing and analysis** of the data received from EEA member countries. They also work as extensions of the EEA in specific topic areas.

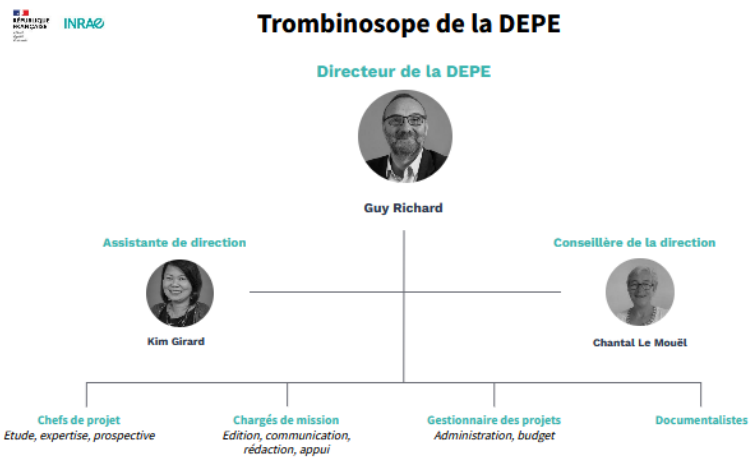

Figure 15: DEPE's governance structure

The DEPE team is comprised of twenty permanent engineers and contractual staff specialised in collective scientific assessment and foresight, documentation and communication, as well as logistical support specialised in project management. The DEPE applies the Charte Nationale de l'Expertise (National Expertise Charter), and its processes are traceable. For each project, it assembles committees of around twenty experts, both internal and external to INRAE, who work over a period of 18 to 24 months.

The experts called upon for collective scientific assessments belong exclusively to public higher education and research establishments. Foresight studies also involve experts from the socio-economic world. Some projects are conducted in partnership with other public research establishments (e.g. Ifremer, CNRS).

The sponsors and partners of the assessment and foresight projects meet in a monitoring committee, which ensures that each project runs smoothly, in line with the established research agreement. An advisory committee is set up for each assessment, enabling the parties involved to be consulted (1) at the start of the project on the scope of the consultation, the questions posed by the sponsors, and their handling by the group of experts, (2) at the end of the project on the results obtained and the lessons to be learned.

Annex 2: Key informant interview guideline

This is an interview guide developed for key expert interviews, integrating research topics relevant for Task 4.1, Task 2.1 and Task 5.1

Introducing BioAgora (10 min)

- presentation of the people representing BioAgora at the meeting
- short presentation of BioAgora, of the organisations composing it and of its goals (focusing on what BioAgora is trying to do, in particular the role of orchestration in relation to the BDS, and what we need to get there)
- short open discussion to answer the questions that people from the interviewed organisation may have.

Many questions regarding what the Science Service will become are still unresolved, and we hope that building on your experiences you could help us foresee the shape it may take and how you think it could support existing actors in strengthening current and future SPSIs.

Ask permission and start recording the discussion if allowed.

Position of the organisation in the SPSI landscape (15 min)

- How would you explain your organisation's role in relation to the EU Biodiversity Strategy (or global biodiversity policy if they are acting at the global scale)?
- Who are those actors with whom you're collaborating the most?
- Are there any relevant actors whom you are missing a strong connection with, or whom you would like to develop a stronger collaboration?
- If not mentioned: How do you see your organisation's role in bridging across different actors of the EU science-policy sphere on biodiversity?

Governance mechanisms (15 min)

- Could you briefly explain the governance mechanisms of your organisation? (Skip this question if we are part of / know very well the given organisation)
- Could you explain some of your organisation's best practices to achieve (policy) impact?
- How do you ensure transparency / accountability when reaching such impacts?
- Do you have any best practices that ensure the inclusivity of knowledge generation / knowledge sharing processes? If explanation needed: by inclusivity we mean that different knowledge forms are included, or unusual (marginalised) actors are engaged in these processes.
- If responses were not rich enough, you can also ask: What are the pros and cons of the governance mechanisms of your organisation in relation to the BDS, and the lessons learned over time?

Capacities (15 min)

- Which types of capacity development initiatives does your organisation have, if any?
- What do these initiatives hope to achieve, and what are the main pros and cons you've experienced?
- Beyond what you provide, have you identified any (remaining) capacity gaps (in particular in relation to SPSI, biodiversity conservation and BDS implementation)? If the response was not rich enough, you can also ask:
- What type of capacities are lacking?
- Who (which actors) are lacking capacities the most?
- Who could provide more / better CD to reach out to these actors? In which form?

Future expectations (15 min)

- In your opinion, what is missing in the Biodiversity SPSI landscape to change the status quo / achieve institutional transformation?
- How do you imagine a new actor like the science service could help you achieve your organisation's mission with regard to biodiversity policy (incl. Design and implementation)? This question could potentially be skipped or asked in a light way at first, and then further investigated by asking (either during the same meeting if time allows, or during another meeting, or during a meeting with another person of the same institution) if this new actor could help by creating which connections, by including which actors in its governance, and by building which capacities.

Introducing Task 2.1 survey (20 min)

- Before closing the interview, we would like to go through a quantitative question, which helps us assess the landscape of actors at the science-policy interface. Therefore, we would like to ask a multiple-choice question where relationships between your organisation and other relevant organisations could be mapped. We will do this by using an online platform to more easily administer your responses.
- Open the online survey and fill in the networking questions.

Closing (5 min)

- We would like to keep in touch with you and engage your organisation in developing the science service, therefore we would like to know if there are other colleagues within the organisation whom we can potentially contact later on. The interview should end by asking whom we should contact if we need further information about the themes of the different tasks, so that we also imply that it would be an ongoing conversation.
- It's important to know what type of research needs to be conducted to reach the BDS goals. Is your organisation involved in any activities that help defining such research needs? (These activities could, for example, involve identifying important knowledge gaps by searching literature, by interviewing stakeholders, by organising workshops or by scanning for future threats in the horizon.) If yes, please provide a name for a contact person we could invite for a further interview of the topic.
- We are also interested whether you identified knowledge gaps about how previous data, tools, projects fed into the Biodiversity Strategies implementation. Or maybe you have personal experience with EU projects/ data that helped the BDS strategies? If yes, please provide a name for a contact person we could invite for a further interview of the topic.
- Do you have any other people in mind within or beyond your organisation you think would be important for us to contact? If yes, please provide a name for the contact person(s)

Annex 3: Ethical assessment of a sociocratic governance framework

This ethical assessment has been prepared by Harineeswari Meenakshi Sundaram, member of the BioAgora Ethics Committee.

The Sociocratic model highly aligns with the core values of Ethical Infrastructure like equity, Inclusion, sustainability, and accountability, enhancing collaboration and decision-making in the SSBD. The ethical implications of using a sociocracy model in SSBD are generally positive, however careful implementation is necessary to address concerns related to power dynamics, facilitator neutrality, sustainability, and participant motivation.

1. **Inclusive Decision-making:**[4]

    a. Sociocracy promotes consultation and participation of stakeholders from diverse perspectives, ensuring that the consideration of all voices is essential. However, participation does not guarantee genuine influence leading **to disproportionate influences despite structured decision-making**.

    b. Biodiversity Science must be evidence-based to ensure effective conservation strategies. However, **participatory decision-making** may lead to **conflict between scientific evidence and stakeholder opinions** since it allows all perspectives equal weight without safeguards (prioritising public sentiment over rigorous scientific findings).

Mitigation strategies:

- Mechanisms to ensure balanced decision-making should take place like **allocating speaking time fairly** (in sensitive decisions, using **anonymous voting mechanisms** can help resist intimidation and influence

[4] Study participants and consortium members emphasized the importance of consultation to understand the wider context, gain diverse perspectives, acquire more knowledge, and challenge assumptions. These principles align with the sociocratic focus on mandatory consultations and inclusive discussions, ensuring decisions are made collaboratively and with a comprehensive understanding.

from powerful stakeholders, and also the risk of consensus pressure). **Neutral facilitators** play a key role in actively intervening if discussions become unbalanced.

- Inputs and concerns from stakeholders should be reviewed but final decisions on scientific matters should rest with evidence-based expert panels.

2. **Neutral Facilitation:**[5]

   a. Though sociocracy incorporates neutral facilitation it can be difficult to achieve and **impact decision fairness**.

   b. If facilitators are not adequately trained, they may have **personal or institutional biases** that could shape how discussions are guided and how consensus is reached.

Mitigation strategies:

- Establish **clear ethical guidelines** for facilitators, including **conflict-of-interest policies** and **training processes**.
- Implement **feedback mechanisms** to allow participants to **assess facilitators' neutrality** and **effectiveness**.
- In response to potential failure to ensuring neutrality, clear mechanisms for **holding facilitators accountable** should be established.
- Appointing independent observers or ethics advisor to **monitor facilitation processes** could also be thought about.

3. **Decision-making and Scientific Integrity:**

   a. Since decisions are based on consent rather than majority rule in a sociocratic model, **tension between consensus and scientific evidence** may arise. (For example, in biodiversity science, some issues require firm, evidence-based actions)

   b. Reaching consensus can be **time-consuming**, contributing to **slower decision-making** and delay in urgent interventions.

Mitigation strategies:

- Defining **clear rules** on **when scientific evidence overrides consensus and time-sensitive decision-making processes** for urgent biodiversity threats.
- Create a **fast-track decision-making process** for urgent biodiversity-related issues.

4. **Sustainability, Motivation and Participation:**

   a. Stakeholders and experts need **clear incentives** for participation-without them continuous stakeholder involvement could become unsustainable.

[5] Neutral facilitation was recognized as crucial for fair discussions. Sociocracy provides structured, role-based governance, including neutral facilitators, to ensure balanced and equitable participation.

If the decision-making is perceived to be slow, or unimpactful, some stakeholders may lose motivation.

Mitigation strategies:

- Create **tangible incentives** for stakeholder participation and provide opportunities for participants to see the impact of their contributions. (such as acknowledgement in reports, access to knowledge resources, or stipends for their time?)

A hybrid approach, as suggested by the Task4.1 team, offers a more balanced and ethically sound alternative to a purely sociocratic governance model. By integrating key elements of sociocracy while incorporating ethical mitigation strategies, a flexible framework could be developed that maintains ethical integrity and fosters a more inclusive and effective decision-making process.

Annex 4: Ethical assessment of the proposed SSBD governance framework

Primary Concerns Identified

- **Power Concentration & Commission Influence:**
  - Excessive representation of Commission-dependent organisations in the Transformative and Innovation Board
  - Risk of "we pay you, so you do what we want" dynamics undermining independence
  - Internal Commission hierarchies (DG ENV intimidating other DGs and partners)
  - Potential for financial threats to override scientific findings
- **Financial Dependencies & Conflicts:**
  - Multiple organisations (Biodiversa+, EEA, etc.) financially dependent on Commission funding
  - Paid staff hosted by KCBD creating conflicts of interest with request management
  - Mixed paid/unpaid dynamics creating inherent power imbalances
  - Staff job security potentially tied to request volume rather than quality
- **Governance Structure Issues:**
  - Lack of clear terms of reference for each governance body
  - Unclear accountability mechanisms and oversight
  - Missing safeguards against misconduct, lack of engagement, or misuse of influence
  - Sociocratic consent-based decisions vulnerable to financial pressure
- **Representation & Independence Gaps:**
  - Limited truly independent scientific representation
  - Missing voices from diverse sectors, civil society, and knowledge systems
  - Geographic and demographic imbalances
  - Questionable inclusion of some organisations (e.g., Future Earth) while excluding others (e.g., Eklipse)
- **Request Management Vulnerabilities:**
  - Potential for political filtering of requests
  - Risk of accepting low-quality requests to justify staff positions
  - Unclear criteria for request acceptance/rejection
  - Possible manipulation of ticketing system by those with vested interests