# Improving the Framework of Science to Policy Translations to Strengthen the Food Systems Transition

Aida TURRINI, IT| February 2024

SCAR
Standing Committee
on Agricultural Research

## Introduction

*Enhancing science–policy interfaces for food systems transformation* (Singh et al., 2021) is a major challenge as complex research topics need to be addressed, and the results need to be integrated in a wide puzzle where parts interact with each other to produce effective impacts. All impacts can interest several sectors and at different levels of the society, so policymakers cope with the governance of the system to ensure a long-term sustainability and to manage possible trade-offs.

Adopting food systems lens (Gill et al., 2018), connecting stakeholders at all scales, and strengthening science to policy and society interfaces (SPSIs) are the three main indications that the High-Level Expert Group constituted by the European Commission included in the work "Everyone at the table" (European Commission, 2022a). The recommendations included in this report invite *to i) multilateral institutions must strengthen and adapt existing SPIs with additional resources and a broader mandate to engage across sectors and scales; ii) they should cooperate with member states to fund a series of dedicated taskforces to fill knowledge and data gaps; and iii) they should collectively invest in a global coordination hub to build capacity, convene regional assessments as well as forecast and model trends*. (European Commission 2022a). This is because *successful policy actions must be based on scientific rigor that is credible, relevant and impactful* (European Commission, 2022a). So, the science-to-policy path represents a crucial component of the process to ensure this.

To this end, it is essential to create a broad and inclusive science-policy-practice interface through strong partnerships between food policy networks (FPNs) and research institutions. R&I policy support and competence development are essential to support FPNs in their ambition to contribute to food system transformation. Impactful FPNs could build a broad and inclusive science-policy-practice interface with the power to guide food system transformation effectively towards a shared vision by generating transformative knowledge, integrated policies, and agency among food system actors. This refers to an FPN´s ability i) to engage with scientists to introduce and expand topical knowledge; ii) organize support for the active integration of transformative transdisciplinary research approaches; iii) generate integrated policies, and iv) engage with civil society actors and business to focus on action (Den Boer et al., 2023).

This will require the representation of different actor roles, such as the roles of process facilitators, intermediary or knowledge broker, change agent, critical analyst, and capacity builder (Fazey et al., 2018; Hilger, Rose & Kell, 2021; Wittmayer & Schapke, 2014). Furthermore, FPN leaders it is important to make FPN leaders familiar with novel methodologies and tools (e.g., Baungaard et al., 2021) used for stakeholder analysis and engagement and for supporting them in the inclusion of stakeholders (Kok, Gjefsen, Regeer, & Broerse, 2021), and for stimulating transformative learning, reflexivity, monitoring, and evaluation (e.g. via reflexive monitoring action), Van Mierlao et al., 2010).

Food systems (FS) research is expected to cover the entire value chain in its widest form and their interactions; from ecosystems services, primary production (agriculture, aquaculture & fisheries), harvesting, storage, processing, packaging, distribution, retailing, service sector, waste stream management and recycling, food and feed safety, to consumers, nutrition for citizens' health & well-being, and diet related diseases (SCAR, 2016; FAO, 2018; von Braun et al., 2021). The term research, in this case, also covers science-based policy advice as managed within the SAPEA project (CORDIS, 2023). It is noteworthy to stress that the uptake of scientific information by policy concerning both strategies/agendas and specific regulations, corresponds to which is defined as a policy mix (EEA, 2022).

Research and Innovation and Policy have a bidirectional relation «R&I policy makers and funders have considerable influence in shaping the enabling environment for research and innovation» (SCAR, 2018). On the other hand, research projects or programmes provide knowledge for policy-making, i.e., evidence that can be used. This can be easier if the information is appropriately presented to policymakers and stakeholders (European Commission, 2022a) to produce actionable science (Mair et al., 2019) . Therefore, it was considered relevant to seek examples of successful cases where research outcomes are part of policy formation, especially to focus on the key contributing and hindering elements in translating science into policy.

These examples will allow the identification of key resources whose provision would benefit the uptake of research by policymakers and establish a set of best practice principles that enable the effective translation of science/research outputs to be incorporated into the policy cycle (Figure 1).

Science to Policy is crucial in all contexts dealing with complex issues, like environmental topics (EEA, 2022) and the One Health approach (Bronzwaer et al., 2022). Food Systems are undoubtedly multi-dimensional, multi-level, multi-actor, multi-challenges, and prone to trade-offs. Then, the importance of the science-to-policy path is acknowledged in many European documents, where it is seen as a crucial point because scientifically valid data should drive and support the decision-making process for food system transformation. This ensures the appropriateness of the interventions and the context. Table 1 reports the primary sources of information concerning bridging policy and research.

**Figure 1:** The Classic Policy Cycle


**Table 1.** European Commission documentation relevant to Science-to-Policy topic.

| Document | Reference |
|---|---|
| Mair, D., Smillie, L., La Placa, G., Schwendinger, F., Raykovska, M., Pasztor, Z. and Van Bavel, R., Understanding our Political Nature: How to put knowledge and reason at the heart of political decision-making, EUR 29783 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-08621-5, doi:10.2760/374191, JRC117161. https://publications.jrc.ec.europa.eu/repository/handle/JRC117161 | Mair et al., 2019 |
| SAPEA, Science Advice for Policy by European Academies. (2020). A sustainable food system for the European Union. Berlin: SAPEA. https://doi.org/10.26356/sustainablefood | SAPEA, 2020 |
| European Commission, Directorate-General for Research and Innovation, Webb, P., Sonnino, R., Everyone at the table: co-creating knowledge for food systems transformation, Webb, P. (editor), Sonnino, R. (editor), Publications Office of the European Union, 2021a, https://data.europa.eu/doi/10.2760/21968 | European Commission, 2021a |

| Document | Reference |
|---|---|
| European Commission, Directorate-General for Research and Innovation, Recommendations to the United Nations' Food Systems Summit Scientific Group from the European Commission's High-Level Expert Group to assess needs and options to strengthen the international Science Policy Interface for Food Systems Governance, 2021 July,https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/recommendations-international-science-policy-interface-food-systems-governance-2021-07-06_en | European Commission, 2021b |
| European Commission, Directorate-General for Research and Innovation, Webb, P., Sonnino, R., Fraser, E. et al., Everyone at the table – Transforming food systems by connecting science, policy and society, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/440690 | European Commission, 2022a |
| European Commission, Directorate-General for Research and Innovation, Everyone at the table – Transforming food systems by connecting science, policy and society, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/917562 | European Commission, 2022b |
| European Commission, Supporting and connecting policymaking in the Member States with scientific research 2022. Commission Staff Working Document. Brussels, 25.10.2022 SWD(2022) 346 final. https://knowledge4policy.ec.europa.eu/sites/default/files/SWD_2022_346_final.PDF | European Commission, 2022c |
| EEA – European Environment Agency. Transforming Europe's food system — Assessing the EU policy mix. EEA Report No 14/2022. https://www.eea.europa.eu/publications/transforming-europes-food-system | EEA, 2022 |
| European Commission, Directorate-General for Research and Innovation, Common Policy Centre. Common Strategy and Foresight Service. Future of Science for Policy in Europe: Scenarios and Policy Implications – Foresight on Demand Project. First edition September 2023 https://op.europa.eu/en/publication-detail/-/publication/424ea70a-640c-11ee-9220-01aa75ed71a1/language-en/format-PDF/source-293925594 | European Commission, 2023a |
| European Commission. Commission Recommendation of 12.12.2023 on promoting the engagement and effective participation of citizens and civil society organisations in public policy-making processes. Brussels, 12.12.2023 C(2023) 8627 final. https://commission.europa.eu/document/fcb629fe-ca20-4019-b1f6-392c286fdedf_en | European Commission, 2023b |

Science Policy Interfaces, «SPIs play different roles in generating and/or distilling scientific outputs, promoting better understanding of the current/future food system conditions, catalysing dialogue among stakeholders, and setting priorities for national and global research. Each has a different topical/sectoral focus, varied membership models, diverse modalities of governance and work, a range of outputs and activities, a range of relationships with UN, EU or other agencies offering secretariat support, and a variety of funding sources. All of them offer valuable contributions such as reports, discussion fora, evidence prioritisation, scenario building and policy applications, etc. Some support global scientific endeavours, others catalyse regional dialogues across multiple constituency platforms, and still others focus on harmonizing sub-regional (inter-governmental) strategies, policies, and research programmes.» (European Commission 2021a, p.11).

The High-Level Expert Group (HLEG) established by the European Commission necessity of scaling down Science Policy Interfaces (SPIs) from the global to the local to build supportive environments that will be connected to society, creating the Science-Policy-Society Interfaces (SPSIs). Scaling new and already existing SPIs is one of the recommendations to face challenges in food system transformation from the global to the local level. (European Commission, 2022a; 2022b)

Research projects provide the scientific knowledge to use in decision-making, either demand- or supply-led. Therefore, it is crucial to identify successful cases in translating and transferring project results to policy. Technology development and adoption, capacity development, and policy influence are three categories of impact pathways (Douthwaite et al., 2017; SCAR, 2018).

Identifying key contributing and hindering factors is particularly important to define models/infrastructures where the science-to-policy path is implemented (Singh et al., 2021). On the other hand, the policy can create a favorable environment for research and support the adoption of ex-ante approaches in improving projects' impacts (SCAR, 2018).

## Examples of research projects on food system components that had an impact on public policy and services (Action 3 Survey)

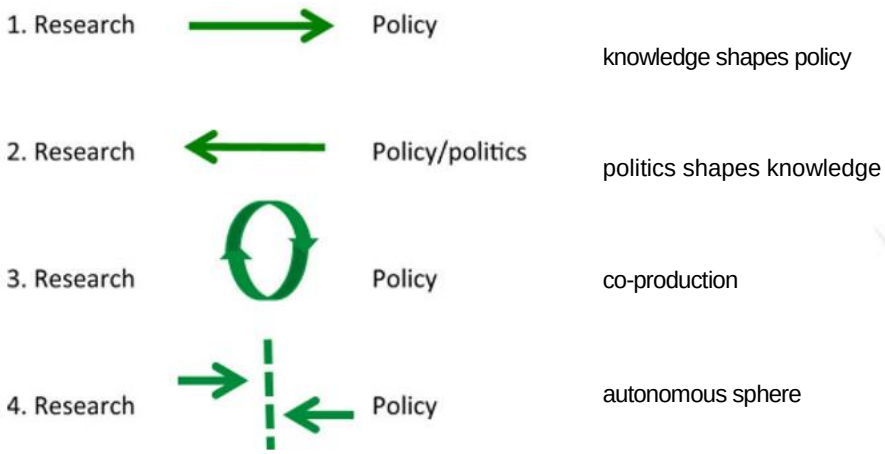
A series of impactful cases constituted by research activities whose results were translated into policy (agendas, interventions, services) was collected in order to analyse elements that characterized the science-to-policy path, especially stressing what the respondents considered key contributing and hindering factors (SCAR_FS_MS Survey Science to Policy_Final). The collection included 59 cases from 14 countries: Belgium, Croatia, Denmark, Finland, France, Germany, Hungary, Italy, Ireland, Lithuania, Romania, Spain, Sweden, The Netherlands.

Most of the cases that included single projects, sets of multi-projects, and programmes in different areas (animals, circular economy, cultivar, education, environment indicator, fish farming, food certification, food safety, food system, food waste, front-of-pack, genetic modification, monitoring, nutrition/nutrients, organic agriculture, organic food processing, packaging, service, toolbox), and were publicly funded (97%).

The collected examples are for the most **publicly funded** (97%), led either by **research organizations/academia** (69%) **or public authorities** (31%), and generating an **impact at national** (68%), **and/or international** (27%), **and/or sub-national level** (5%). Projects/programmes cover the whole food chain concerning several research topics. The majority of collected cases was **policy-driven and impacted policy** (95%). Indeed, for the most part, research was **demand led** (90%) **and informs/contributes to new policy/schemes** (86%).

They were classified according to the theory by Boswell & Smith (2017) (Figure 2). In the collected cases two options occurred: "knowledge shapes policy" (41%) and "co-production" (59%) research policy relation.

**Figure 2:** Four frameworks to theorize research-policy relations



Factors extracted from survey participants' narratives are summarized in **Table 2**. The type of key contributing factors - that is, resources to facilitate the uptake of scientific results into policy, reported by the responders can be grouped into three sets: i) resources referring to a **structural level**; ii) resources concerning the personal level; iii) resources provided by **information systems** (platform, software tools, databases, etc.) afferent to the **knowledge area**; iv) other resources are available or acquirable through **funding**.

At the structural level, the first key contributing factor is creating communities resulting from aggregating and networking food system actors with researchers and policymakers where dialogue and co-creation are facilitated. In this context, issues that research projects /programmes can investigate to produce actionable science can be more easily identified, e.g., through living labs. Such communities need good organization, the capacity to maintain over time "relevance, pertinence, quality assurance, and scientific rigour" of research projects/programmes and stability to reproduce successful science-to-policy pathways within different contexts defined by the "political environment" (agri-food/rural policy, governmental goal, national directives, etc.). In this context, participants competencies and abilities can be enhanced as their knowledge and experiences, their contacts, the motivation for co-creation greatly help in conducting activities in the communities. This include accessing and using the use of available information and tools (platforms, software, etc.). All the aspects above mentioned require supporting and/or funding.

**Table 2:** Key contributing factors to successful science-to-policy path grouped by category (structural level, personal level, knowledge area, resources/funding) and the type of research-policy relation

| **Structural level** |
|---|
| Aggregating and networking different stakeholders/policymakers/researchers |
| Co-creation |
| Communication |
| Creating communities, involvement of public authorities/policy, institutional contacts |
| Identifying specific issues to work on (targeted measures, scaling up local experiences, small project well-focused) |
| Innovative space like living lab |
| Organization of the research team |
| Political environment (agri-food/rural policy; governmental goal; national directives, etc.) |
| Practice to science and finally to policy process |
| Relevance, pertinence, quality assurance, and scientific rigour of the project/programme |
| Stability/persistence of the research group |
| **Personal level** |
| Active participation |
| Competencies |
| Contacts |
| Dialogue |
| Knowledge and expertise of researchers and stakeholders/policymakers, including citizens |
| Motivation for co-creation |
| Networking skills |
| **Knowledge area** |
| Assessment of impacts |
| Good results (successful project) |
| Knowledge gaps to research on |

| |
|---|
| Monitoring impacts |
| National nutrient/dietary database |
| Review of scientific knowledge |
| **Resources/Funding** |
| Funding instrument |
| Supporting development of regional sector |
| Supporting the participation of experts |

The collected examples of successful science-to-policy path encountered also obstacles that is important to cope with. Hindering factors that were reported are summarized in **Table 3**.

"Bringing together the interests and perspectives of science, industry/industry association, policy makers, and consumer advocates" is a **challenge** in the complexity of the context so the systems could not be sufficiently adequate; "**lack of resources** always represent a limitation that can make the process fragmented when moving from practice to policy"; whereas **uncertainties** deriving from changes at various levels during the implementation of projects/programmes and the transfer of knowledge to policy, but also disparities and differences between local and national/international situations, can hinder the science-to-policy process as "differences of context at local level create always an obstacle to move from practice to policy through research".

**Table 3:** Factors hindering the success of science-to-policy path grouped by category (challenges, lack of resources, uncertainty) and the type of research-policy relation

| |
|---|
| **Challenges** |
| Bureaucracy |
| Complex regulatory context |
| Different interests and perspectives |
| Practise esily evaluable by policymakers |
| System not adequately structured |
| The cultural beliefs |
| **Lack of resources** |
| Expertise/capacity |
| Funds |
| Interest |
| Knowledge |
| Suitable finance and business models |
| Time/short term perspective |
| Trust |
| **Uncertainty** |
| Changes in personnel |
| Changes in the political/managerial structure (interlocutors, priorities) |
| Differences of context at local level |
| Disparities among EU countries |

Willingness to continue; European collaborations; Policy that is nested into research; Scaling-up an innovation from practice to policy; Capacity to rely on the right expertise to develop targeted research with a small amount of money; Innovation brokers, are also elements that survey participants indicated to be considered in implementing projects/programme aimed at transferring knowledge with the goal of fostering a long-term relationship between researcher stakeholders and policymakers.

## Reflections on the practical experiences

The reflections done in the 20th October 2022 online workshop (SCAR, 2022) combined with the results from the survey can be summarized as following.

The **success factors** that lead to evidence-based decision and policymaking are:

- **Policy-driven** and **demand led** cases
- **Co-production** relationship between research and policy, co-creating project design and expected impacts
- **Public-funded** research cases
- **Involvement of multiple stakeholders** (researchers, policymakers, practitioners & consumers organization) in **co-designing and co-producing** the formulation of national research programmes
- Use of **platforms** and **tools** to elaborate the results to produce actionable science

The **needs and gaps** to reach an adequate science to policy interface are:

- Work on the relationship between the value of **consumption** and the value of **production**
- Deeper **understanding** from the science/research side of how the policy word ticks
- Need to consider **market actors** in the translation of science
- Need to consider civil servants working for the operationalisation of policy packages
- Evaluating the scale international, national, sub-national level
- A **platform** that 'forces' food system stakeholders to work together
- **Metrics** for universities/institutes involvement in the policy process & impact
- Maintaining **scientific independence** for researchers
- Consideration of the **longer time** research needs to address questions

The **actions** needed to reach an adequate science to policy interface are:

- The use of **knowledge brokers** who understand the realms of policy and research
- The development of a **programme** to help bring both sides together
- **Flexible landscapes** of more formalized and **ad hoc interfaces**
- **Incentives** to facilitate the application of policy decisions and actions
- Researchers and policy makers should **engage society** in the dialogue
- **Living labs** at country level are an opportunity to experiment the science policy interface process
- Aggregating and networking researchers, policymakers and food system stakeholders is a fundamental action to allow for dialoguing between all the actors, creating SPSIs
- Identifying issues the communities can to work on for the food system transformation considering different scenarios

- The **Food System Partnership** should play an important role in the SPI where policy makers and stakeholders acting as **funders** should not only play the role of distributors of funds, but being co-planners of research programmes, building together actionable science for policy

## Recommendations

- A comprehensive archive of documents with access to existing platforms and a repository of research results and up-to-date documentation related to the science-to-policy topic is crucial (see, e.g., JRC, 2024).
- Scheduling sets of events concerning the food system topics.
- Research projects/programmes can be considered existing granular SPIs to establish a suitable framework where formal structures and informal communication flows strengthen communications and, ultimately, knowledge transfer from science to policy.
- Establishing a co-production research-policy relationship to support the science-to-policy path.
- In this environment, multi-actors and multi-domain coordinating groups can enable the outcomes uptake in policy-making at all levels, e.g., local/global, strategy/specific interventions, and so forth.
- Co-creation by researchers and policymakers of the project's objectives can provide information opportunely structured to facilitate both the request by policy to research and the uptake of the project's results into policy, maximizing the impacts.
- Strengthening the potential of food policy networks to build a broad and inclusive science-policy-practice interface through R&I policy support and competence development to harness the potential of R&I more effectively - acting as a catalyst for change (Den Boer et al, 2023).
- A clear list of key contributing and hindering factors and an analysis of needs and gaps in defining the more suitable actions are resources that can support the dynamic design of science-to-policy pathways, including updates when necessary.

## References

Baungaard, C., Kok, K.P.W., den Boer, A.C.L., Brierley, C., van der Meij, M., Gjefsen, M.D.Broerse, J.E.W. …, 2021. FIT4FOOD2030: Future-proffing Europe´s food systems with tools for transformation and a sustainable food systems network. Nutrition Bulletin, 46, 172–184. https://doi.org/10.1111/nbu.12502

Boswell, C., Smith, K. Rethinking policy 'impact': four models of research-policy relations. Palgrave Commun 3, 44 (2017). https://doi.org/10.1057/s41599-017-0042-z

von Braun J, Afsana K, Fresco L, Hassan M, Torero M. Food Systems – Definition, Concept and Application for the UN Food Systems Summit. UN – United Nations Food Systems Summit 2021 Scientific Group. 2021. Leadership | United Nations.
https://knowledge4policy.ec.europa.eu/sites/default/files/food_systems_concept_paper_scientific_group_-_draft_oct_261.pdf

Bronzwaer, S., Catchpole, M., de Coen, W., Dingwall, Z., Fabbri, K., Foltz, C., Ganzleben, C., van Gorcom, R., Humphreys, A., Jokelainen, P., Liebana, E., Rizzi, V., Url, B. 2022. One Health collaboration with and among EU Agencies – Bridging research and policy, One Health, 15, 100464, https://doi.org/10.1016/j.onehlt.2022.100464.

CORDIS (accessed on 03/07/2023), Science Advice for Policy by European Academies (SAPEA). Horizon 2020 project 2016-2022.

de Boer, A.C.L., Van der Valk, A. J.J., Regeer, B.J., Broerse, J.E.W., Food policy networks and their potential to stimulate systemic intermediation for food system transformation. Cities 135 (2023) 104239

Douthwaite, B., Mur, R., Audouin, S., Wopereis, M., Hellin, J., Moussa, A., Karbo, N., Kasten, W., and Bouyer, J. 2017. Agricultural Research for Development to Intervene Effectively in Complex Systems and the Implications for Research Organizations. KIT Working Paper 2017:12. https://agritrop.cirad.fr/584543/1/Douthwaite_al_AR4D_Research_organizations-2017_v6.pdf

EEA – European Environment Agency. Transforming Europe's food system — Assessing the EU policy mix. EEA Report No 14/2022. https://www.eea.europa.eu/publications/transforming-europes-food-system

European Commission, Directorate-General for Research and Innovation, High-Level Expert Group, Webb, P., Sonnino, R. (2021a). Everyone at the table : co-creating knowledge for food systems transformation, Webb, P. (editor), Sonnino, R. (editor), Publications Office of the European Union. https://data.europa.eu/doi/10.2760/21968

European Commission, Directorate-General for Research and Innovation. (2021b). Recommendations to the United Nations' Food Systems Summit Scientific Group from the European Commission's High-Level Expert Group to assess needs and options to strengthen the international Science Policy Interface for Food Systems Governance. https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/recommendations-international-science-policy-interface-food-systems-governance-2021-07-06_en

European Commission, Directorate-General for Research and Innovation, High-Level Expert Group, Webb, P., Sonnino, R., Fraser, E. et al., (2022a). Everyone at the table – Transforming food systems by connecting *science, policy and society*, Publications Office of the European Union. https://data.europa.eu/doi/10.2777/440690

European Commission, Directorate-General for Research and Innovation, Everyone at the table (2022b) Transforming food systems by connecting science, policy and society, Publications Office of the European Union. https://data.europa.eu/doi/10.2777/917562

European Commission, Supporting and connecting policymaking in the Member States with scientific research 2022c. Commission Staff Working Document. Brussels, 25.10.2022 SWD (2022) 346 final. https://knowledge4policy.ec.europa.eu/sites/default/files/SWD_2022_346_final.PDF

European Commission, (2023a). Directorate-General for Research and Innovation, Common Policy Centre. Common Strategy and Foresight Service. Future of Science for Policy in Europe: Scenarios and Policy Implications – Foresight on Demand Project. First edition September 2023. https://op.europa.eu/en/publication-detail/-/publication/424ea70a-640c-11ee-9220-01aa75ed71a1/language-en/format-PDF/source-293925594

European Commission. (2023b). Commission Recommendation of 12.12.2023 on promoting the engagement and effective participation of citizens and civil society organisations in public policy-making processes. Brussels, 12.12.2023 C (2023) 8627 final. https://commission.europa.eu/document/fcb629fe-ca20-4019-b1f6-392c286fdedf_en

FAO – Food and Agriculture Organization of the United Nations. Sustainable food systems - Concept and framework. 2018. https://www.fao.org/3/ca2079en/CA2079EN.pdf

Fazey, I., Schäpke, N., Caniglia, G., Patterson, J., Hultman, J., van Mierlo, B., Säwe, F., Wiek, A., Wittmayer, J., Aldunce, P., Al Waer, H., Battacharya, N., Bradbury, H., Carmen, E., Colvin, J., Cvitanovic, C., D'Souza, M., Gopel, M., Goldstein, B., Hämäläinen, T. Wyborn, C. (2018). Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. Energy Research & Social Science, 40, 54–70. https://doi.org/10.1016/j.erss.2017.11.026

Gill, M., den Boer, A. C. L., Kok, K. P. W., Breda, J., Cahill, J., Callenius, C., Caron, P., Damianova, Z., Gurinovic, M. A., Lähteenmäki, L., Lang, T., Laperrière, A., Mango, C., Ryder, J., Sonnino, R., Verburg, G., Westhoek, H., Reeger, B. J. and Broerse, J. E. W. 2018. A systems approach to research and innovation for food systems transformation. https://orca.cardiff.ac.uk/id/eprint/131581/

Hilger, A., Rose, M., & Kell, A. (2021). Beyond practitioner and researcher: 15 roles adopted by actors in transdisciplinary and transformative research processes. Sustainability Science, 16, 2049–2068. https://doi.org/10.1007/s11625-021-01028-4

Kok, K. P. W., Gjefsen, M. D., Regeer, B. J., & Broerse, J. E. W. (2021). Unraveling the politics of "doing inclusion" in transdisciplinarity for sustainable transformation. Sustainability Science, 16, 1811–1826. https://doi.org/10.1007/s11625-021-01033-7

JRC, Joint Research Centre newsletter Science for Policy Bullettin January 2024 (https://ec.europa.eu/newsroom/know4pol/newsletter-archives/50267 ). Last access 22/01/2024.

Mair, D., Smillie, L., La Placa, G., Schwendinger, F., Raykovska, M., Pasztor, Z. and Van Bavel, R., Understanding our Political Nature: How to put knowledge and reason at the heart of political decision-making, EUR 29783 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-08621-5, doi:10.2760/374191, JRC117161. https://publications.jrc.ec.europa.eu/repository/handle/JRC117161

van Mierlo, B., Regeer, B., van Amstel, M., Arkesteijn, M., Beekman, V., Bunders, J., … Leeuwis, C. (2010). Reflexive monitoring in action. A guide for monitoring system innovation projects. Retrieved from https://edepot.wur.nl/149471

SAPEA, Science Advice for Policy by European Academies. 2020. A sustainable food system for the European Union. Berlin: SAPEA. https://doi.org/10.26356/sustainablefood

SCAR – Standing Committee on Agricultural Research. Terms of Reference SCAR FOOD SYSTEMS Strategic Working Group – (SCAR FOOD SYSTEMS SWG). 2016. Document: TOR_Food-systems_SWG-final.pdf (scar-europe.org) https://scar-europe.org/images/FOOD/Documents/TOR_Food-systems_SWG-final.pdf

SCAR – Standing Committee on Agricultural Research. Programming research and innovation (R%I) for improved impact, 2018 https://scar-europe.org/programming-research-and-innovation-for-improved-impact, https://knowledge4food.net/wp-content/uploads/2018/10/181031_scar_policybrief-programming_research_innovation.pdf

Singh, B.K., Arnold, T., Biermayr-Jenzano, P. et al. Enhancing science–policy interfaces for food systems transformation. Nat Food 2, 838–842 (2021). https://doi.org/10.1038/s43016-021-00406-6

Wittmayer, J. M., & Schäpke, N. (2014). Action, research and participation: Roles of researchers in sustainability transitions. Sustainability Science, 9, 483–496. https://doi.org/10.1007/s11625-014-0258-4T

## List of Abbreviations:

**FPN -** Food Policy Networks
**FS -** Food systems
**HLEG** - High-Level Expert Group
**SAPEA** - Science Advice for Policy by European Academies
**SPI** -Science Policy Interface
**SPSIs** - Science - Policy - Society Interfaces
**SCAR**- Standing Committee on Agricultural Research
**SWG** – Strategic Working Group


## Acknowledgements:

**SCAR FOOD SYSTEMS SWG members**; and **Noeleen McDonald**, Department of Agriculture, Food and the Marine, IE; **SCAR TST**: **Silvia Scaramuzzi**, **Sara Gabellini**, **Francesca Gerini**, University of Florence, IT; **Minna Huttunen**, Ministry of Agriculture and Forestry, FI; **Niels Halberg** and **Susanne Hansen**, Aarhus University, DK