

Case studies of current approaches for aligning national research strategies, programmes and activities

Task 4.2, ERA-LEARN2020 Project

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EXECUTIVE SUMMARY

In December 2008, the Council of the European Union adopted the concept of “Joint Programming” to promote the pooling of national research efforts in view of making better use of Europe's public R&D resources.¹ Joint programming is a strategic process whereby EU Member States agree on common visions and Strategic Research Agendas in order to address major societal challenges that cannot be tackled only at the national level in a coordinated and collective way. The practical implementation of joint programming mainly relies on the alignment of existing or planned national research strategies, programmes and activities in areas of mutual strategic interest. The European Research Area and Innovation Committee's High Level Group for Joint Programming indeed notes that “*alignment is the key to successful joint programming*”.²

This publication contains nine case studies that examine different approaches and modalities used by EU Member-States (and Horizon2020 Associated Countries) to facilitate the alignment of national research strategies, programmes and other activities in the context of joint programming processes. These case studies have been conducted in the framework of Task 4.2 of the [ERA-LEARN2020 Project](#) (2015-18), and build on the “Typology of Alignment” developed under the project's [Task 4.1](#). The case studies do not constitute in-depth evaluations of ongoing practices. Instead they aim to *illustrate* how selected approaches have been used to promote alignment at strategic, operational and financial levels, and what the key “*lessons learned*” are from these experiences. The case studies outline the main benefits and challenges practitioners have faced when putting in place such approaches, and the key factors for their successful implementation. The main target audience for this publication are national research funding and research performing organisations.³

The case studies examine approaches and instruments used in the context of existing EU public-to-public research partnerships (P2P), including European Research Area networks (ERA-NETs), Joint Programming Initiatives (JPIs) and Article 185 Initiatives. They focus on (joint) actions undertaken by participating countries/ organisations at different stages of the research programming cycle and that rely on different cooperation modes (see Table 1 below). Some of the examined cases rely on a “bottom-up” approach (e.g., transnational networks of researchers) while others follow a “top-down” logic (e.g., Article 185 initiatives). The case study analysis relies on a review of existing literature and targeted interviews with relevant P2P programme managers and participants.

Table 1. Overview of the case studies conducted under Task 4.2 of the ERA-LEARN2020 Project

Case study	Type of approach/ action
1- FACCE-JPI's Knowledge Hub for Modelling European Agriculture with Climate Change for Food Security (MACSUR)	Set up of a transnational and interdisciplinary network of scientists
2- European Metrology Research Programme (EMRP) Article 185 Initiative's Joint Research Proposals	Establishment of a strategic, long-term and integrated joint research programme
3 - Infravation ERA-NET Plus' Real Common Pot Approach	Organisation of a transnational call for research proposals via delegated funding and management
4 - Network for Humanities in the European Research Area (HERA)	Set up of a transnational network of research funding organisations
5 - JPI Oceans' Shared Research Vessel	Transnational access to a national research infrastructure
6 – FACCE-JPI's Joint Mapping Meetings	Conduct of joint mapping of existing (national and EU) research
7 - Open Access Infrastructure for Research in Europe (OpenAIRE)	Open access to national research data/ results
8 - Network of Centres of Excellence in Neuro-Degeneration (CoEN)- JPNP	Establishment of a transnational network/ alliance of research performing organisations
9- JPI Climate's Updated Strategic Research and Innovation Agenda	Elaboration and update of common strategic priorities, via a participatory approach

¹ COM(2008) 468 final

² ERAC-GPC 1305/1/14/REV1, 30 October 2014

³ Good practices to promote alignment at the policy level have been identified by the Horizon 2020 Policy Support Facility, see [here](#).

Key lessons learned

All case studies highlight the multiple benefits that accrue to countries/ organisations that align their national research strategies and activities, including: (i) greater cost-efficiency and effectiveness, thanks to the possibility to leverage research related resources (e.g., research funding, infrastructures or data) that exist elsewhere (cf., MACSUR, JPI Oceans, OpenAIRE cases); (ii) a stronger visibility at EU and international levels (cf. MACSUR and EMRP cases), including increased international partnership-building opportunities (cf. HERA and CoEN cases); and (iii) strengthened scientific excellence and research capacities (cf. MACSUR and HERA cases).

The cases also pinpoint a number of factors that enable effective alignment at strategic, operational and financial alignment, such as :

- *Strategic:* **Agreement on common strategic research priorities from the start**, via the development and update of a common Strategic Research (and Innovation) Agenda across participating countries. Such an Agenda should be well-understood and owned by all relevant national actors; reflect stakeholder views (thanks to participatory approaches), and be based on a common mapping of already existing research (cf. JPI Climate and FACCE-JPI cases). Developing such joint Agendas is a crucial alignment mechanism in itself, and is a prerequisite to enable additional alignment actions along the programming cycle.
- *Operational:* The **set-up of centralized governance and programme management and implementation systems** (e.g., via delegation of responsibility to a single legal entity, cf. Infravation, HERA and EMRP cases), which allows setting up an integrated steering body as well as **common programme procedures** for all participants (e.g., for proposal evaluation; project selection; monitoring and evaluation; and reporting), as such generating important efficiency gains and facilitating collective strategic reflections. Such centralized management systems should be adequately resourced by participating countries.
- *Financial:* The **cross-border pooling of national funding**, either via: (i) a “real common pot” with no “fair return on investment” which allows to fund a maximum of research projects irrespective of the applicants’ nationality (cf. Infravation case); (ii) a “virtual common pot” with a “fair share financial model” whereby national in-cash contributions are calculated according to national research budgets (cf. HERA case), (iii) a virtual common pot with national funding reserves, which allows for greater flexibility (cf. CoEN case); or (iv) the pooling of in-kind institutional or infrastructure-related resources (cf. EMRP and JPI Oceans cases).

Yet, the case studies also highlight a number weaker points or obstacles that need to be addressed, such as:

- The lack of **multi-annual, sustainable (funding) mechanisms** to promote long-term and deep alignment (except for Art. 185 initiatives); the need for greater commitment by countries (e.g., willingness to pool institutional funding) and more effective incentive/ support mechanisms from the EC.
- The need to **adjust some national research funding rules**, so as to facilitate the pooling of resources. In some countries it is not possible to transfer money to an organisation outside of the country or to allocate such money without a competitive call. There is a need to better explain the benefits of resource pooling and facilitate transnational agreement around a common set of financial and operational rules.
- Insufficient investments made in stakeholder (industry) engagement, communications and **knowledge dissemination and transfer** activities (cf. EMRP; CoEN cases).
- The need to **align open data policies** across participating countries/ organisations, in order to promote the standardisation and inter-operability of research outputs and allow end-users to access them more easily, for example via the establishment of a common online platform or database (cf. OpenAire case).

The choice of alignment approach or action used often depends on (i) the research area concerned (e.g., volume of already funded research; EU vs. national value-added); (ii) the level of ambition (e.g., commitment for alignment, mutual trust, history of cooperation); and (iii) institutional features (e.g., ability to commit a share of national funding to transnational research; the share of competitive vs. institutional funding).

Finally, some countries have first established networks of researchers or research performing organisations, or shared a research infrastructure, to **build trust and facilitate networking and mutual learning**. This has in turn often facilitated the implementation of deeper alignment approaches, such as the launch of an integrated joint research programme. Alignment can thus be seen as a gradual, long-term process.



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

**Case Study No.1- FACCE-JPI Knowledge Hub on Modelling European Agriculture
with Climate Change for Food Security (MACSUR)**

Due date of deliverable: April 2016 (M16)

Actual submission date: May 2016 (M17)

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific alignment modality, namely the **Knowledge Hub** for Modelling European Agriculture with Climate Change for Food Security (MACSUR Phase 1, 2012-15) launched as a pilot activity of the *Joint Programming Initiative on Agriculture, Food Security and Climate Change* (FACCE-JPI). While focussing on the specific experience of FACCE-JPI MACSUR, the case also provides lessons for other JPIs and public-to-public research networks wishing to develop a similar approach to facilitate networking and capacity building amongst European researchers, and to promote alignment more generally. The case study does however not aim to provide an in-depth assessment of the MACSUR Knowledge Hub.

The study highlights the Knowledge Hub's many benefits. MACSUR has enabled to establish a **European interdisciplinary network of scientists** that has facilitated the coordination and pooling of already (nationally) funded research activities in a specific field. This has in turn helped reduce research fragmentation and duplication, and achieve greater cost-efficiency. In addition, the Hub has led to (i) enhanced European research excellence thanks to the generation of new interdisciplinary knowledge on the impacts of climate variability on regional farming systems and food production in Europe; (ii) increased European modelling capacity thanks to joint training and capacity building activities for participating researchers (which has been particularly beneficial to less research intensive countries); and (iii) a better visibility and influence on European and international policymaking (including at the level of the Intergovernmental Panel on Climate Change).

Yet, the MACSUR Knowledge Hub has also suffered from (i) relatively limited Member-State funding (€10M over 3 years for a Hub that gathers over 300 researchers from 18 countries) and diverging financial contributions across participating countries; (ii) limited data-sharing within the Hub; and (iii) a relatively low sustainability potential (in part due to the 3 year funding cycle). Moreover, while the bottom-up governance structure of the Hub has allowed for the re-adjustment of certain activities to new emerging researchers' needs, it has also made centralised coordination and oversight, and the development of a shared common vision amongst participating researchers, more challenging.

The case study builds on the ERALEARN2020 Task 4.1 ("Definition and Typology of Alignment"), and relies on a review of existing literature and targeted interviews with the MACSUR Project Manager and researchers participating in the Knowledge Hub. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN2020 Task 4.2 "Assessment of Current Approaches to Alignment". The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and alignment approach (strategic, operational and/or financial) and are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber and Caroline Lesser from the FACCE-JPI Secretariat/ Institut National de Recherche Agronomique (INRA). The authors are grateful to Martin Köchy (MACSUR Manager), Floor Brouwer (MACSUR TradeM Coordinator), Klaus Mittenzwei (Norwegian researcher participating in MACSUR TradeM) and Pierre Martre (French researcher participating in MACSUR CropM) for their useful inputs. They would also like to thank the ERA-LEARN Consortium partners and Advisory Board for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs, and overall strengths and weaknesses of a specific alignment modality, namely the Knowledge Hub for Modelling European Agriculture with Climate Change for Food Security (MACSUR Phase 1) launched in the framework of the *Joint Programming Initiative on Agriculture, Food Security and Climate Change* (FACCE-JPI). The study assesses in what context such a tool is best used for promoting greater alignment of national research programmes and activities. While focussing on the specific experience of FACCE-JPI MACSUR1, it also provides **lessons for other JPIs and public-to-public research networks** wishing to develop a similar approach to facilitate networking and capacity building amongst European researchers, and alignment more generally.

According to the Typology of Alignment (ERA-LEARN 2020 Task 4.1), the Knowledge Hub instrument is mostly used by JPIs during the research implementing phase to help establish a **network of researchers** active in a well-delineated thematic area of high priority to participating countries. It is a modality that facilitates alignment at the operational level, and mainly involves individual researchers as well as research funding and performing organisations.

2. Key features of the Knowledge Hub

2.1 Overview

The MACSUR Knowledge Hub was established in June 2012 as a three-year pilot joint activity of the FACCE-JPI (Phase 1 or MACSUR1, 2012-2015). It is a **network** that builds on the concept of “Networks of Excellence”⁴ and that gathers European researchers who already have secured (national) funding for modelling and assessing how climate variability and change will potentially affect regional farming systems and food production in Europe and the associated risks and opportunities for European food security. The MACSUR Knowledge Hub initially brought together 180 researchers originating from 17 countries⁵ under the coordination of a German research institute, Thünen Institute of Market Analysis. As of 2015, it gathered **300 researchers from 18 countries**.

The Knowledge Hub is divided into three sub-groups or Themes focused on agricultural modelling for crop production (CropM); for livestock and grassland production and farm-level aspects of production (LiveM); and for the assessment of socio-economic impacts (TradeM). Besides **networking** amongst researchers, the MACSUR Knowledge Hub also allows for **capacity building** and the conduct of new **research** coordinated at trans-national level.

MACSUR was launched in order to address the overarching Core Theme 1 of FACCE-JPI’s Strategic Research Agenda (SRA) “Sustainable food security under climate change”, which, among others, identifies scenario building and modelling as a research topic on which interested FACCE-JPI member-countries should work together jointly.⁶ The Knowledge Hub was considered the most suitable tool to address such a topic, since there was a need to **bring together and improve already funded research** and expertise, via enhanced networking, research collaboration and capacity building amongst researchers working on the same topic. In light of its success, FACCE-JPI member-countries decided in June 2014 to renew the Knowledge Hub’s mandate until May 2017 (Phase 2 or MACSUR2, 2015-2017).⁷

2.2 Mission and activities

The work of the FACCE-JPI MACSUR Knowledge Hub aims to benefit European policymakers, public institutions, farmers, consumers, and extension services (e.g. consultancy firms and technical institutes):

- On a scientific level, MACSUR seeks to advance the science of modelling of agriculture under climate change in order to improve food security through interdisciplinary European collaboration;

⁴ https://cordis.europa.eu/fp6/instr_noe.htm

⁵ Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Israel, Italy, Norway, Poland, Romania, Spain, Sweden, Netherlands, United Kingdom (list of participating research organisations: <http://macsur.eu/index.php/about/partners>).

⁶ FACCE-JPI SRA (2012)

⁷ MACSUR2 Proposal

- For policymakers, farmers and other stakeholders, MACSUR aims to contribute to better identifying the consequences of climate change adaptation and mitigation measures and the availability, affordability and accessibility of food for populations across Europe; and
- Overall, MACSUR aims at bolstering Europe's capacity to respond to the challenges of food security and climate change and assist countries outside the EU in their endeavours towards food security in the face of climate change.⁸

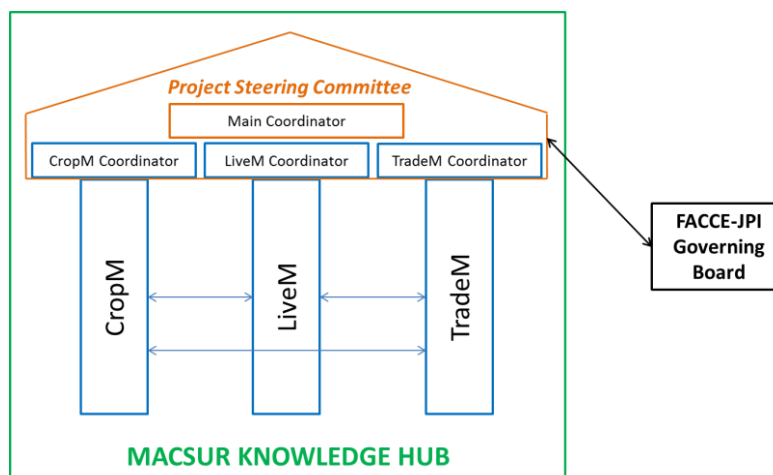
Thereby, MACSUR aims to contribute to FACCE-JPI's overall goals of: (i) improving the alignment of national and European research programmes, (ii) increasing high quality transnational research in the food security, agriculture and climate change nexus, and (iii) improving the societal impact of European research.⁹

Funding for the Knowledge Hub provided by participating countries can be targeted at new research activities and/or coordination and networking activities (which imply coordination costs, travel expenses and costs for running joint workshops, meetings and trainings). All Knowledge Hub activities are carried out by Research Groups which have been selected at **national level** after submitting a Letter of Intent to their national funding agency. The selection criteria were not common to all MACSUR Research Groups; one country could decide to have one or several Research Groups. Research Groups were first encouraged to address national research priorities. In a second instance, they were invited to identify and agree on common research priorities with other countries' Research Groups in order to draft a common transnational research proposal for MACSUR..

2.3 Governance structure

MACSUR's Project Steering Committee is in charge of the coordination of the Knowledge Hub and ensures regular communication with national representatives in FACCE-JPI's Governing Board. It facilitates the interaction between the three MACSUR Themes in line with the main objectives of the Hub (see Fig. 1). A management unit supports all organisational and secretarial tasks.

Figure 1. Structure of the Knowledge Hub



Source: MACSUR website

2.4 Approximate resources and time needed for implementation

MACSUR brings together research groups that already work and have funding in a specific thematic area. Its operation relies on **Member-States funding**, which totalled approximately €10.1 million during the first 3-year period. MACSUR's funding relies on (i) Members States' **in-kind contributions of €2.7 million** (e.g. researchers salaries), aimed at facilitating the convergence of already funded and on-going research, and (ii) Members States' **in-cash contributions of €7.4 million**, which allow to finance coordination and networking activities as well as the funding of new research activities that are part of the MACSUR common research agenda (see Fig. 2 below).

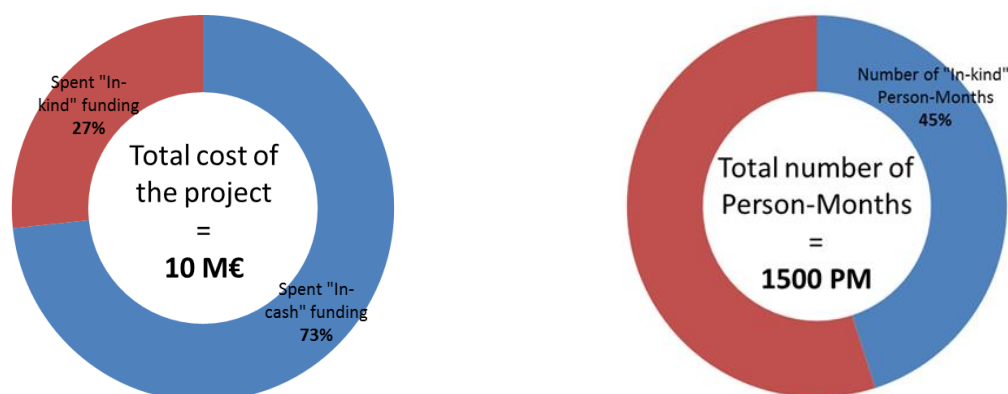
⁸ MACSUR First Phase Report 2012-2015

⁹ FACCE-JPI SRA (2016)

Financing originates from national research funding agencies or ministries¹⁰, with the selection of research groups, the amount of funds and the regulation of their use governed at the **national level**.

A wide spread among national in-cash contributions is however noteworthy (between €0 and 1M€). The FACCE-JPI Secretariat, which is mainly financed by the European Commission (via a Coordination and Support Action), has supported the launch of the Hub.

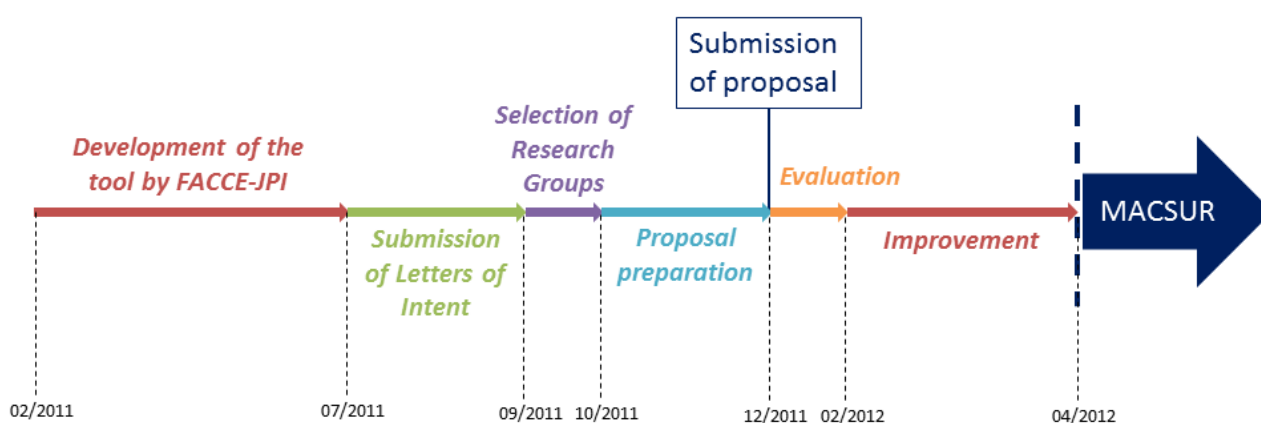
Figure 2. Resources used during Phase 1 (2012-2015)



Source: MACSUR First Phase Report 2012-2015

The timeline presented in Fig. 3 below indicates that approximately **14 months** were required in order to launch the Knowledge Hub (see Annex 2 for more information).

Figure 3. Timeline for implementation



Source: Presentation "FACCE-JPI Knowledge Hub" (26.09.2012, Berlin)

3. Principal outputs to date

The main outputs listed below¹¹ have greatly contributed to the **advancement of European modelling capacities across several disciplines**, thanks to structured joint description and comparisons of models and methodologies, model evaluation (including stakeholder requirements) and improvement of models and integrated models. In particular, **trans-national data management** is in the process of being improved with the intention of developing a common data classification and rating tool for exploration of existing data sets, the publishing of data sets generated by MACSUR¹² and the harmonisation of databases, which is key for generating future joint research. So far, MACSUR has supported:

¹⁰ The list of funding agencies/ministries are available at:

http://macsur.eu/images/web_content/ProjectDocuments/CA_with_Annexes_FINAL+Access.pdf

¹¹ Summary of Results of MACSUR1 (2015); MACSUR First Phase Report (2015)

¹² <http://macsur.eu/index.php/toolbelt-preview>

- The publication of joint scientific papers (278 articles in peer-reviewed journals and submitted manuscripts, of which 172 are joint publications) and contributions to books and reports (including the report of the Intergovernmental Panel on Climate Change (IPCC));
- The development of applied regional case studies (currently in Finland, Austria and Italy) that allow to assist policy makers and actors in the agri-food chain in identifying effective and efficient adaptation and mitigation measures and potential consequence scenarios;
- The development of common “European Representative Agricultural Pathways” as an input to global scenario exercises (linked to the socio-economic and greenhouse gas concentration IPCC scenarios);
- The organisation of 8 major international congresses and presentations in over 450 scientific conferences;
- The organisation of training courses and workshops;
- The improvement of media coverage, e.g. via overview papers in high-profile journals and the maintenance of a website also targeting a non-academic audience.

4. Overall strengths of this tool, including key achievements

The Knowledge Hub offers many benefits for researchers and stakeholders. It facilitates a greater coordination and pooling of existing research activities in a specific field, which allows to achieve greater funding efficiency but also enhanced research excellence, impact and capacity in Europe, hence being an important tool for alignment, particularly at the operational level. Key benefits are outlined below.

4.1 Strong operational alignment thanks to the establishment of an interdisciplinary network of scientists

MACSUR has enhanced the collaboration of researchers across borders, triggered greater critical mass and improved regular personal interactions especially through meetings between specialists, workshops and scientific congresses, fostering “*a vibrant community of international researchers*”.¹³ MACSUR has identified a common transnational research priority and pooled together existing research regarding this specific focus, thus helping **avoid fragmentation of research**, and as such contributing to increased alignment amongst national research activities. The common MACSUR research agenda reflects the will to jointly prioritise research questions (e.g. with the selection of regional case studies), synchronise timing of national research programmes in the concerned area of research, avoid duplications and enhance research synergies across Europe.

In particular, the Knowledge Hub has brought together modelling experts and scientists in all concerned fields of agricultural research and increased multi-disciplinary interactions, enabling scientists from different backgrounds to meet (as they would probably not have met if MACSUR did not exist). The coordination of a large number of researchers has facilitated alignment at operational level. This is something which would have not been possible at the level of individual research organisations. In addition, **trust-building and mutual understanding** of knowledge requirements in other disciplines has improved. Moreover, the Knowledge Hub is an effective framework to facilitate the subsequent implementation of **other actions and tools** that foster alignment, such as joint research programmes and coordination of scientific techniques.

4.2 Scientific excellence: Generation of new European knowledge thanks to the pooling of existing research

The Knowledge Hub has allowed an efficient **sharing of existing knowledge** within and across science disciplines as well as a **collective production of new knowledge**. In particular, the process of generating new knowledge has been facilitated through MACSUR by enabling cross-disciplinary teams to meet, agree on common objectives and work together (e.g. through the matchmaking activity of MACSUR to bring together relevant partners for new project calls). Thus, interdisciplinary cooperation and coordination between various scientific fields have significantly improved *within* each Theme (CropM, LiveM and TradeM) and should further improve in the future, including through the increasing cooperation *across* Themes (i.e. cross-cutting activities planned in MACSUR2), in order to carry out integrated impact assessments of climate variability on farming systems and food security. This has in turn triggered breakthroughs and innovations in the field of modelling (thanks to the possibility of comparing different models by meta-analyses). Significant advancements in agricultural modelling have also been achieved thanks to the division of the Knowledge Hub into its three focus Themes.

¹³ MACSUR First Phase Report 2012-2015

4.3 *High flexibility of the Knowledge Hub structure*

After elaborating a common research proposal, Knowledge Hub participants have had the possibility to reorganise their tasks and responsibilities in the Hub if needed. Hence, significant decision-making power was attributed to participating researchers. In several participating countries there were no mandatory deliverables or milestones, and hence no real defined obligations as it is the case in a typical research project. Although this has led to difficulties in respecting deadlines and in governing the Hub (see also point 5.2 below), the Knowledge Hub structure also gave room for a **higher responsiveness to emerging needs** while allowing researchers to spend less time on reporting. Even though several activities that were initially planned in the MACSUR proposal have not been implemented, ideas for many other activities that were not planned at the beginning of MACSUR but that emerged during the networking and joint knowledge creation process could be taken forward by MACSUR participants.

4.4 *Effective capacity building of researchers*

The Knowledge Hub offers joint training of young and senior researchers and support for junior researchers to participate in workshops and conferences. The exchange and comparison of models, model outcomes and scenarios directly contributes to an increased capacity of European research as it gives a common basis for new research. In particular, MACSUR represents an **opportunity for less research-intensive countries** which can more easily pick up on current trends and methodologies, initiate contacts with established sub-networks and become involved in cutting-edge project proposals involving MACSUR partners. More generally, the Knowledge Hub has led to the adoption of good-practice examples from other participating scientific communities.

4.5 *Greater cost-effectiveness and high return on investment*

MACSUR's funding mechanism allows for a greater convergence across nationally funded research activities and helps fosters joint activities, which trigger **economies of scale** (e.g. joint training of a large number of researchers at the same time on a same topic). Moreover, despite the relatively small amounts of national funding invested, significant results have been achieved at the Knowledge Hub level thanks to its shared framework and joint activities. Moreover, the Knowledge Hub has triggered a **high leverage and return on investment**: while the MACSUR1 project cost around €10 million, new external grant money resulting from MACSUR networking activities and supporting new project consortia involving MACSUR members amounted to almost €17.5 million.¹⁴ For example, while the United Kingdom only contributed "glue" money (money for networking and coordination) to the Knowledge Hub, the UK Research Councils and the Scottish National Government subsequently made strong investments in the modelling area.¹⁵

4.6 *Increased visibility and influence on European and international policymaking*

The introduction of the Knowledge Hub has led to the establishment of a modelling **network that represents Europe** (as opposed to individual European countries), which can in turn collaborate more easily with other international networks. MACSUR is involved in the global exercise of comparing models, for instance through its partnership with the Agricultural Model Intercomparison and Improvement Project (AgMIP).¹⁶ Furthermore, national research organisations participating in MACSUR increase their visibility and are encouraged to improve their own national coordination through the visibility and coordination of the Hub.

MACSUR has helped raise awareness on the potential impacts of Climate Change on European agriculture and food security. Policy-relevant outcomes have been fostered through interaction with stakeholders. Finally, MACSUR members have also been able to influence national research programs through publications, descriptions of MACSUR's contributions in scientific meetings/workshops/congresses and FACCE meetings/reports, as well as through direct interaction with national representatives.

5. **Overall limitations with this tool, including difficulties encountered during implementation**

The following limitations can generally be encountered when implementing a tool such as a Knowledge Hub.

¹⁴ MACSUR First Phase Report 2012-2015: list of projects and associated funding provided in Annex B8.

¹⁵ Policy Brief on impact assessment of networks (2015)

¹⁶ Köchy et al. (2015). The collaboration between AgMIP and MACSUR

5.1 Funding limitations

Funding within individual Knowledge Hub Work Packages has been too limited, thus hindering opportunities for participation and active contribution of MACSUR members in meetings and workshops¹⁷. Furthermore, participating countries with more limited financial resources could not be as involved as others in the Knowledge Hub's activities since funding is not redistributed. This has also been the case for certain scientific disciplines which suffer from lower access to funds. Furthermore, additional funding and staff is lacking for organisational tasks such as project management, internal communication and organisation within the Knowledge Hub and external interactions, which has hindered the overall progress of strategic decision-making.

While having several benefits, **in-kind contributions** have led to strong limitations in space, time, purpose and legal conditions. In addition, they cannot be redistributed across activities by the Hub's coordinators.¹⁸ A greater amount of in-cash funding would have allowed for more flexibility in implementing new MACSUR research activities. Moreover, no clear common definition of what is a national in-kind contribution has been given: countries hence do not always speak the same language in terms of funding (difference in types of costs covered and order of magnitude), which can lead to difficulties in jointly carrying out coordinated research or networking activities. Furthermore, the **divergence of in-cash funding across participating countries** – some only receiving cash for a few travels, others being able to hire more staff to carry out new MACSUR research activities or to be involved in the overall coordination of the Hub – has led to strong differences in the leadership capacity across countries.

5.2 Limits of the decentralised bottom-up approach

The decentralised funding mechanism of the Knowledge Hub has triggered a bottom-up organisation and a decision-making process by consensus. While such an approach has brought some benefits, such as increased flexibility and responsiveness to emerging researchers' needs (see point 4.3 above), this structure has not been as effective as a top-down governance structure in coordinating the Hub's activities and in developing a common vision for the latter. In addition, the decentralised evaluation and selection process of participating researcher groups, which took place at national levels, hindered the clear definition of the scope of the Hub's work. Finally, due to the lack of a strong and centralised MACSUR decision-making body, it was also challenging to redirect participating countries' financial commitments towards other activities suggested by the FACCE-JPI Governing Board, such as stakeholder engagement.

This approach has also led to **difficulties regarding inter-operability**: as MACSUR relies on national in-kind and in-cash commitments towards a virtual common pot, national rules apply when it comes to deciding which costs are covered and what type of reporting is required. Administrative set-ups and rules greatly differ from one country to another (e.g. regarding funding periods, access to funding for travelling or carrying out research), which has complicated the implementation of MACSUR's activities. Similarly, reporting requirements have not been coordinated among participating countries and FACCE-JPI.

5.3 Lack of coordination regarding data sharing among the MACSUR community

Despite the wish to develop common data management mechanisms and harmonise databases across participating countries, actual data sharing has been harder to achieve within the whole community. Producing data such as climate impact data relevant to agricultural modelling is of high value; it has sometimes been difficult to openly share it among MACSUR participants. However, the added value of sharing such data for improving and comparing models and modelling techniques is also to be considered, especially when willing to participate in a collective initiative such as MACSUR. This is why MACSUR members have been encouraged to share model outcomes and developed scenarios amongst all Hub participants.

5.4 Questionable sustainability potential

The long-term sustainability of the network is hard to evaluate since it relies mainly on the sustainability of its funding system, which was initially guaranteed for 3 years only. This period of time is short regarding the scale of the research concerned and does not sufficiently allow scientists to project their activities into the future.

¹⁷ MACSUR2 Proposal

¹⁸ MACSUR First Phase Report 2012-2015

Furthermore, some of MACSUR's outcomes are not easily measured, which also makes it hard to assess the Hub's longer-term impact and sustainability potential. For example, quantifying knowledge sharing or joint learning is a delicate task, although these processes are fundamental to continuous research capacity building and relevant knowledge production.

Lessons learned from other networking experiences

DEDIPAC (Determinants of Diet and Physical Activity) Knowledge Hub

The DEDIPAC Knowledge Hub was implemented as the first action of the JPI "A Healthy Diet for a Healthy Life" in order to improve understanding of the determinants of dietary, physical activity and sedentary behaviours. As MACSUR, it has also adopted a **common research agenda** which is associated with a specific project structure divided into three Thematic Areas which would correspond to MACSUR2 cross-cutting activities. The Hub helps strengthen linkages between different fields of research.

The main outcome of the Hub is expected to be a **toolbox gathering harmonized infrastructures, methodologies and results** which can be easily accessed and used by stakeholders and decision-makers according to their needs. This toolbox aims to influence policies and stakeholders' activities. DEDIPAC's concern for long-term sustainability is illustrated by its will to build new collaborations and develop its capacity building and dissemination strategies.

COST Action (European Cooperation in Science and Technology)

COST Actions are the main instrument developed by COST, a European framework for cooperation in Science and Technology. They enable the establishment of **networks of (mainly) European researchers** and professionals in order to tackle defined societal challenges. COST Actions are bottom-up tools, i.e. driven by scientists themselves. A COST Action **does not fund additional research but only networking activities** through specific activities which are also used in JPI Knowledge Hubs (e.g. workshops, trainings, etc.).

Yet unlike JPI Knowledge Hubs, COST Actions imply the nomination of a COST National Coordinator for each COST Member Country (who promotes COST Actions within the country), and an independent scientific rapporteur who evaluates the management of the Actions. Another major difference is that they do not trigger the development of a common research agenda, as is the case in the MACSUR and DEDIPAC Knowledge Hubs.

The uniqueness of COST Actions is the involvement of **non-academic partners** originating from industry and governmental bodies, which facilitates the dissemination of research results and practices. Cost Actions also have a strong focus on international partner countries, Inclusiveness Target Countries, gender balance and integration of young researchers.

Source: Lakerveld et al. (2014); DEDIPAC (2015), Periodic Report 0.1.4.; COST Brief and Presentation (September 2015).

6. Conclusions: Suitability and key factors of success

The Knowledge Hub tool implemented in the context of a JPI or another P2P network is well adapted to **well-delineated, interdisciplinary and transnational scientific challenges** which are of **high priority** to participating countries. A Knowledge Hub is most suited for promoting knowledge sharing and joint learning. Hence it can be used when there is already on-going **funded research**. The aim of this tool is to promote alignment mainly at operational level by not only creating a network of scientists (i.e. exchange of knowledge), but also strengthening their capacity and knowledge in a specific research field, and helping them jointly carry out research. The number of researchers involved has to be carefully managed and may have to be limited in order to keep the Knowledge Hub efficient in coordinating networking and research activities.

Key factors of success:

1) At strategic level:

- **Clearly delineate the scope of the Hub:** The Knowledge Hub tool is more efficient when focusing on a well-delineated area of research. It is also important to interlink activities in an efficient way in order to provide relevant consolidated results at the European level.
- **Put in place a balanced governance structure:** In addition, a clear governance model should be defined in order to achieve an efficient complementarity between bottom-up and top-down decision-making processes. A top-down definition of the research strategy should take account of the desire for “ownership” and strong involvement of scientists and the need for flexibility at the researchers’ level.

2) At financial level:

- Secure **long-term funding for networking and coordination tasks** to provide a backbone (hub) for internal and external links.
- Develop an **adapted funding mechanism** for the use of the Knowledge Hub tool: this could for instance lead to the creation a common pot allowing for the redistribution of fresh money according to the availability of financial resources across regions/countries and disciplines (e.g. for travelling or to carry out new research activities). A balanced contribution of in-kind funding and fresh money is also more effective, as in-kind funding comes with some restrictions.

3) At operational level:

- Ensure an **efficient management** of activities: e.g. regular meetings of the project steering committee, support of the secretariat, regular meetings for researchers/coordinators involved in interdisciplinary tasks and meetings for researchers involved in specific research disciplines, newsletters.
- Avoid artificial structural barriers by (i) **adapting the reporting system**, to avoid double reporting (i.e. at country and JPI level); and (ii) **aligning national administrative rules** which would contribute to greater interoperability (e.g. funding periods, equal eligibility rules for knowledge hub members to travel to meetings and carry out new research).
- Elaborate a strategy to **increase visibility and dissemination**: This can in turn contribute to greater sustainability thanks to media coverage, international partnerships, joint publications, organisations of and participation to major scientific congresses, strong interaction with national representatives to influence national research programmes and with the private sector to create relevant innovations.
- Design a strategy for **capacity building and data sharing** in order to improve knowledge creation and contribute to the sustainability of the network (e.g. through training, workshops and support for young researchers).

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DEDIPAC: <https://www.dedipac.eu/>

FACCE-JPI: <https://www.faccejpi.com/>

JPI OCEANS Toolkit: <http://www.jpi-oceans.eu/knowledge-hubs-0>

MACSUR: <http://macsur.eu/>

(4) Interviews

Dr. Floor Brouwer: MACSUR Coordinator of TradeM, Wageningen UR, LEI

Dr. Martin Köchy: MACSUR Manager of the Knowledge Hub, Thünen Institute, Institute of Market Analysis

Dr. Pierre Martre: Researcher participating in MACSUR CropM Theme, French National Institute for Agricultural Research (INRA)

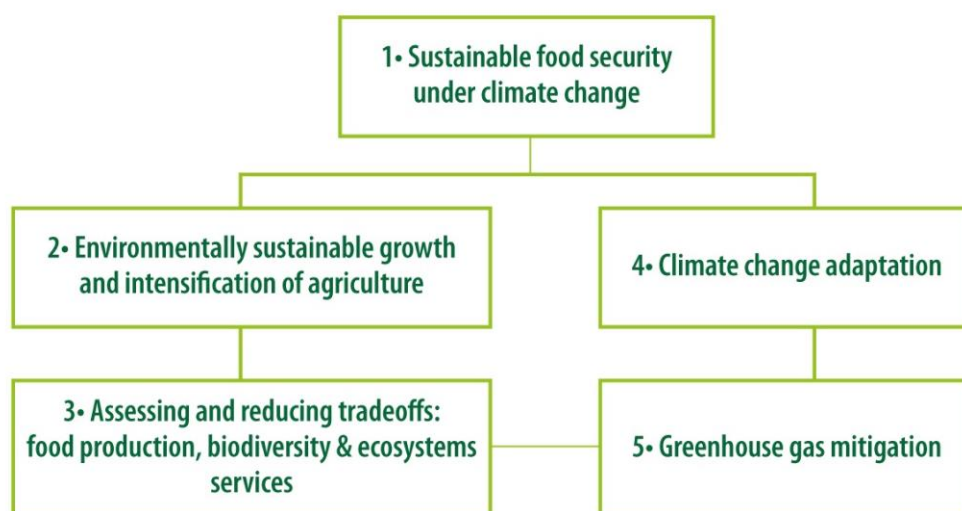
Dr. Klaus Mittenzwei: Researcher participating in MACSUR TradeM Theme, Norwegian Institute for Bioeconomy Research (NIBIO)

ANNEX 1. JOINT PROGRAMMING INITIATIVE ON AGRICULTURE, FOOD SECURITY AND CLIMATE CHANGE¹⁹

The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) was among the first JPIs to be launched by the European Council (October 2010). This initiative brings together **22 countries** that are committed to building an **integrated European Research Area** addressing the challenges of agriculture, food security and climate change. Through their representatives on the FACCE-JPI Governing Board, these countries have agreed on a **common vision** to address these major societal challenges. **The JPI is providing coordination** between the member states in their programming of research to achieve the FACCE-JPI vision (see below).

To achieve this goal, a strong **interdisciplinary research** base, encompassing economic and social aspects in addition to scientific ones, is required. This implies the need for a creative approach towards **aligning national programmes**. The interrelated challenges addressed are European and global and require the effort of multiple actors and stakeholders at regional, national and European levels. Input is provided by policy makers, the scientific community as well as stakeholders. The latter provides the JPI with advice through their representatives in the **Stakeholder Advisory Board**.

To respond to the interconnected challenges of sustainable agriculture, food security and impacts of climate change, the **Strategic Research Agenda** of FACCE-JPI includes five evidence-based interdisciplinary Core research Themes (CT) proposed by the Scientific Advisory Board:



This Strategic Research Agenda has been designed to set out clear **policy-relevant research priorities** on agriculture, food security and climate change in Europe, and to list the strategic actions involved to achieve these goals and align current and future national research programmes.

FACCE-JPI seeks to mobilize the research community across Europe to work together to meet the grand societal challenges by:

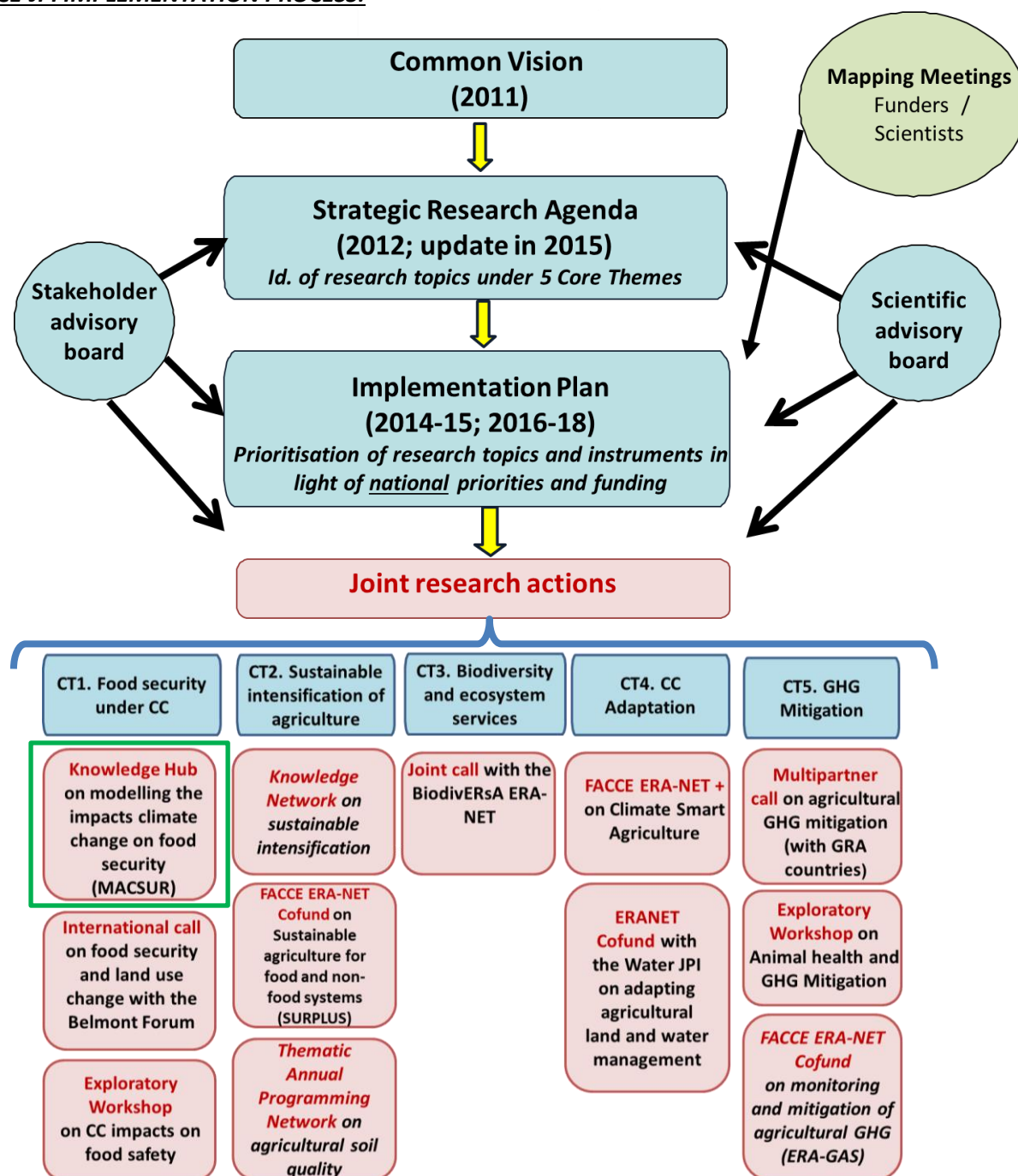
- **Improving the alignment of national and European research programmes,**
- **Increasing high quality transnational research activities within food security, agriculture and climate change, and**
- **Improving European research' societal impact on the challenge of food security, agriculture and climate change.**

FACCE-JPI VISION: *An integrated European Research Area addressing the challenges of Agriculture, Food Security and Climate Change to achieve sustainable growth in agricultural production to meet increasing world food demand and contributing to sustainable economic growth and a European bio-based economy while maintaining and restoring ecosystem services under current and future climate change.*

¹⁹ FACCE-JPI Strategic Research Agenda (2016)

FACCE-JPI MISSION: to achieve, support and promote integration, alignment and joint implementation of national resources in Europe under a common research strategy to address the diverse challenges in agriculture, food security and climate change.

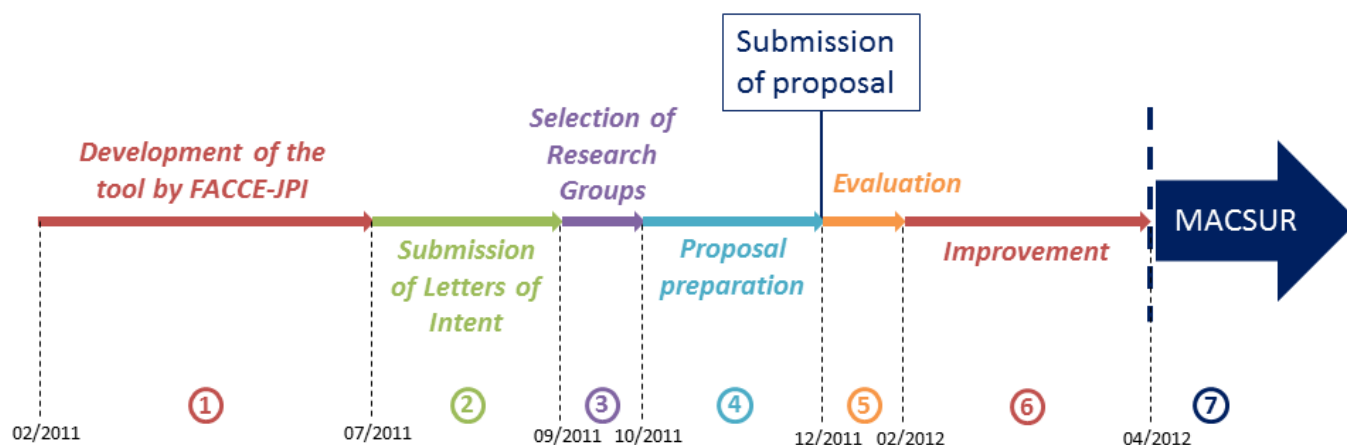
FACCE-JPI IMPLEMENTATION PROCESS:



ANNEX 2. STEPS INVOLVED IN THE IMPLEMENTATION OF MACSUR²⁰

FACCE-JPI developed the Knowledge Hub tool in order to respond to the main scientific challenges identified in Core Theme 1 of its Strategic Research Agenda “Sustainable food security under climate change”, i.e. regarding the need in modelling the potential impacts of climate change on the agriculture and food chain and the expected effects of adaptation and mitigation scenarios at all levels, from the production system to processing activities and consumer demand.

The MACSUR Knowledge Hub was implemented in approximately 14 months from the development of the tool by FACCE-JPI to the official start of the project after approval and improvement of the proposal.



① Preparation and development of the Knowledge Hub tool (beginning of February to mid-July 2011)

The Knowledge Hub tool was built based on the model of the network of Nordic Centres of Excellence: it is designed to facilitate transnational cooperation between excellent researchers in a particular field of research, strengthen the European research capacity in this given field and increase its visibility and societal influence, in particular by providing political advice. MACSUR pools together on-going research activities and resources across Europe by selecting research groups which are already active in the field of modelling agri-food systems in the face of climate change and by developing a joint research agenda.

② Launch of applications (mid-July to beginning of September 2011)

Research Groups which applied to be part of the FACCE-JPI Knowledge Hub were to submit a Letter of Intent online, which demonstrated their scientific excellence in the targeted area of research and described their research capacities and infrastructures to be engaged towards the Knowledge Hub.

③ Selection of Research Groups (beginning of September to mid-October 2011)

The selection process was carried out at a national level based on the criteria of research excellence and capacity building potential. The list of selected Research Groups was then confirmed by the Steering Committee.

④ Proposal preparation and submission (mid-October to mid-December 2011)

This phase started with the first networking meeting which gathered all partners in order to reflect on the Knowledge Hub's structure and management: in particular, they voted for the Themes' coordinators and started the drafting of the workplans). Two other meetings were then held amongst coordinators in order to determine the final list of coordinators and finalize the proposal which was submitted mid-December 2011. Concerning the requested funding, the types of eligible costs varied greatly amongst funding agencies/ministries and could cover:

- Contribution to costs of the Main Coordinator and Theme-Coordinators;
- Travel costs for attending Knowledge Hub meetings;

²⁰ Tinois, N. (2012). Presentation “Joining Forces in Europe: Agriculture, Food Security and Climate Change - FACCE-JPI Knowledge Hub”, September 2012.

- Communication and dissemination costs (workshops, newsletters, etc.);
- Training and capacity building (seminars, summer schools etc.) and mobility; and
- Research costs (e.g. staff and consumables).

⑤ Evaluation Phase (mid-December 2011 to end of January 2012)

The online evaluation was carried out by eight experts of the European Commission, including two members of the Scientific Advisory Board of FACCE-JPI in order to evaluate the proposal in its relevance regarding the objectives of the FACCE-JPI Strategic Research Agenda. 19 criteria were considered, each of them being rated from 1 to 3.

A meeting with the Steering Committee was then organized in order to deliver the evaluation report and discuss the main results including the overall assessment of the proposal, recommendations (e.g. regarding the coordinating team), suggestions for improvement and relevance regarding FACCE-JPI's objectives.

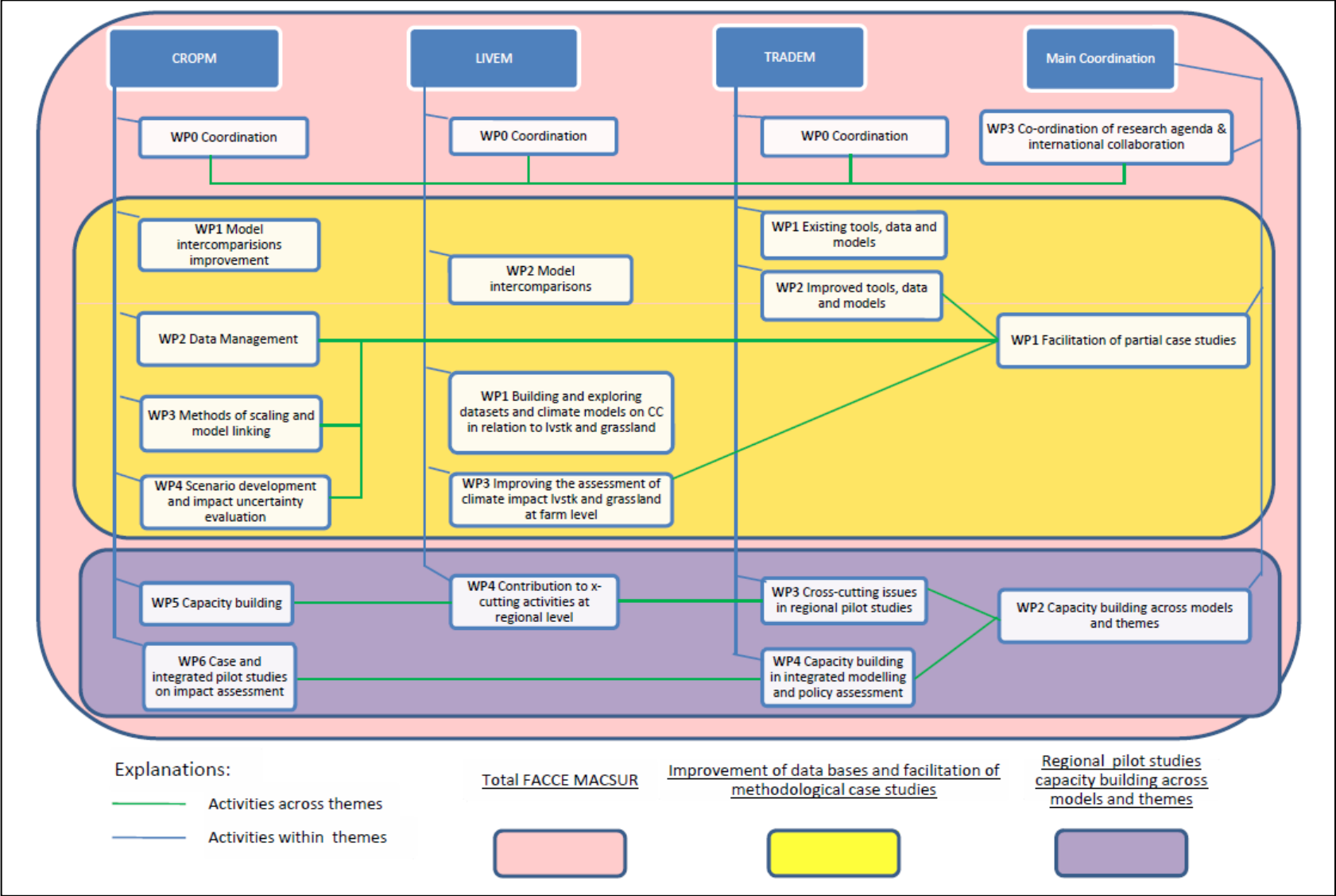
⑥ Improvement Phase (beginning of February to mid-April 2012)

Recommendations were sent to all funders. A meeting between the European Commission and the coordinators was held beginning of March in order to guide their corrections, which were then checked by the European Commission until mid-April.

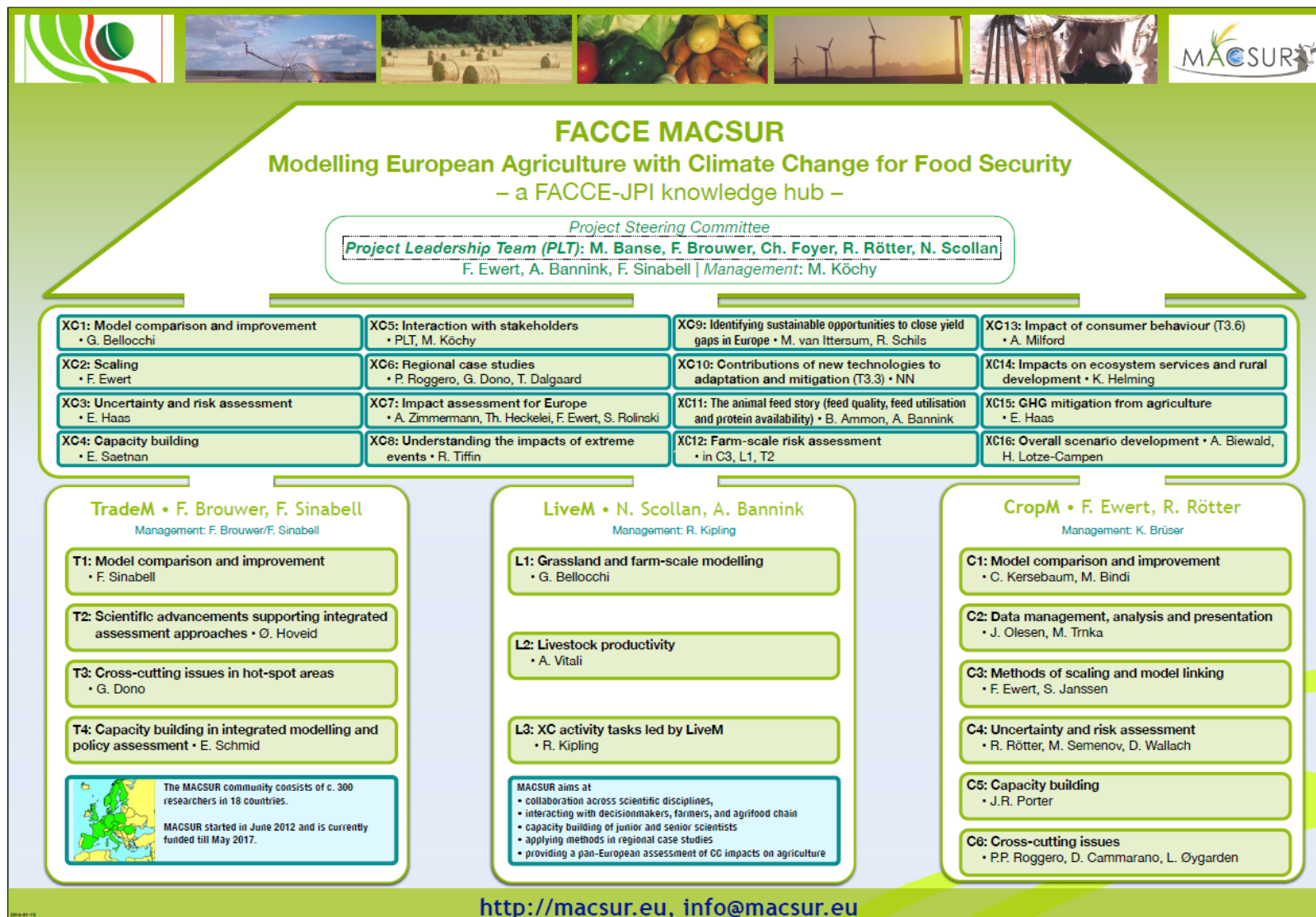
⑦ Launch of MACSUR (official start July 1st 2012)

A press release by FACCE-JPI announced the official start of MACSUR while grant agreements could be signed until end of July. The Kick-Off Meeting was held in Berlin on October 15th and 16th.

ANNEX 3. STRUCTURE OF MACSUR1²¹



²¹ MACSUR1 Proposal



²² http://macsur.eu/images/MACSUR_Files/MACSUR%20%20Hub/Information/Poster%20MACSUR2%20Activities%20v2.4.pdf



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.2- The Article 185 European Metrology Research Programme (EMRP)

Due date of deliverable: April 2016 (M16)

Actual submission date: May 2016 (M17)

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that facilitates alignment of research across countries, namely the European Metrology Research Programme (EMRP, 2009-2017), which was launched under the **Article 185** of the Treaty on the Functioning of the European Union. This “Article 185 Initiative” promotes long-term collaboration and alignment amongst European metrology institutes via the submission of joint research project proposals that target specific economic sectors to which metrology is essential. While focussing on the specific experience of EMRP, the case also provides lessons for other public-to-public research partnerships wishing to develop a similar approach to facilitate the establishment of a **strategic, long-term and integrated European research programme**, and promote alignment more generally. The case study does however not aim to provide an in-depth assessment of EMRP nor Article 185.

The study highlights the Article 185’s many benefits. EMRP has enabled participating countries to achieve strong alignment at strategic, operational and financial levels, thanks to:

- (i) The elaboration of a Common Vision and a joint Strategic Research Agenda, which has been facilitated by the European Association of National Metrology Institutes, EURAMET;
- (ii) Strong transnational programme integration, with a centralised management structure and reporting system;
- (iii) EMRP has achieved results that would have been more difficult to reach at national levels, such as effectively contributing to international standardisation activities. More generally, EMRP has resulted in enhanced research capacity and excellence across Europe thanks to the development of new metrology-related expertise, the sharing of national metrology infrastructures and staff exchanges between participating institutes;
- (iv) In addition, the use of the Article 185 has enabled to mobilise substantial national resources (mostly in-kind) over an 8 year period, leading to strong financial alignment at the European level. Indeed, about **50% of national resources** dedicated to metrology research in Europe have been engaged towards the EMRP.
- (v) EMRP has also allowed increasing the visibility of European metrology research at the global level. EMRP is considered as the principal European actor in the metrology research field.
- (vi) Longer-term sustainability thanks to the important share of EC co-funding (50% of the total budget, or €200M). Furthermore, partnerships built through EMRP projects have been long-lasting after the end of the project.

Yet, EMRP has also suffered from: (i) complex and time-consuming grant application procedures, (ii) limited use of EMRP grants by non-EMRP researchers, which hindered the expansion of research collaboration *beyond* the EMRP membership (yet this issue has been addressed since), (iii) limitations to the EMRP trans-disciplinary approach, due to the organisational structure of some National Metrology Institutes (which sometimes have few interactions with other disciplines); (iv) Insufficient tools for knowledge dissemination and transfer, which could support the development of new policy regulations and industry-led innovation (this problem has been addressed in the EMRP follow-up programme, EMPIR); and (v) relatively low involvement of less-advanced National Metrology Institutes participating in EMRP.

The case study builds on the ERALEARN2020 Task 4.1 (“Definition and Typology of Alignment”), and relies on a review of existing literature and targeted interviews with the EMRP Project Manager and national representatives participating in the programme. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN2020 Task 4.2 “Assessment of Current Approaches to Alignment”. The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) and are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber and Caroline Lesser from the FACCE-JPI Secretariat/ Institut National de Recherche Agronomique (INRA). The authors are grateful to Duncan Jarvis (EMRP Programme Manager), Jörn Stenger (German representative on the EMRP Committee) and Erkki Ikonen (EMPIR Committee Chair) for their useful inputs. They would also like to thank the ERA-LEARN Consortium partners and Advisory Board for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific alignment modality, namely the Article 185 Initiative/European Metrology Research Programme (EMRP, 2009-17) of the European Association of National Metrology Institutes (EURAMET). The study also assesses in what context such a tool is best used for promoting greater alignment of national research programmes and activities in a European context. While the case study focuses on the specific experience of the EMRP, it attempts to draw **lessons** for other European public-to-public research networks wishing to develop a similar approach to promote European research excellence and a greater efficiency of national research funding.

According to the Typology of Alignment, the Article 185 instrument is used during the research implementation phase in view of establishing a **strategic, long-term and integrated European research programme**. It is an ambitious modality that allows for “deep” alignment²³ at strategic, operational and financial levels, and involves many actors in the research programming cycle (policymakers, research funding and performing organisations, and individual researchers).

2. Key features of the Article 185 European Metrology Research Programme

2.1 Overview

The EMRP was established in 2009 by EURAMET as a **multi-annual joint research programme**. The Programme relied on five annual project calls that were launched between 2009 and 2013. It promotes collaboration amongst **European metrology institutes** through the submission of joint research project proposals that target specific sectors to which metrology is essential: energy, industry, environment, health, new technologies and the International System of Measurement Units (SI). The EMRP brings together National Metrology Institutes (NMIs) and Designated Institutes (DIs) from **23 EURAMET Member-States**, as well as from other European and non-European countries.²⁴ It was launched under the Article 185 of the Treaty on the Functioning of the European Union (ex-Article 169 of the EU Treaty), allowing for the coordination and alignment of national research programmes on a long-term basis (eight years). As is further explained below (section 2.4), participating countries contribute to 50% of the total budget for EMRP, mainly in the form of **institutional (in-kind) funding**.

The European Union has recognised metrology as “a cross-disciplinary scientific field which is a vital component of a modern knowledge-based society” and which has “a significant impact on the economy and quality of life within Europe”.²⁵ It has agreed to support the EMRP Article 185 initiative as there was a lack of coordination among European Member-States in the field of metrology research, diminishing its critical mass and societal impact, and the EMRP was considered the most suitable instrument to address such a problem. In light of the EMRP’s success, the EU decided in May 2014 to launch a follow-up Article 185 research programme in the metrology area, the European Metrology Programme for Innovation and Research (EMPIR, 2014-2020, see Box 1 below).²⁶

2.2 Mission and activities

The main objective of the EMRP is to “support scientific development and innovation by providing the necessary legal and organisational framework for large-scale European cooperation between Member States on metrology research in any technological or industrial field.”²⁷ It seeks to **advance research in the science of measurement** by improving existing measurement techniques, developing new ones and increasing the quality of measured data in order to support science research, innovation and new regulations in Europe. EMRP aims to benefit European industry and policymakers, as well as researchers whose activities rely on the advancements in the field of metrology (e.g., measuring water pollution, developing the SI measuring units). Furthermore, the EMRP aims to

²³ Refers to the level of intensity, see Typology of Alignment.

²⁴ Austria, Belgium, the Czech Republic, Denmark, Germany, Estonia, Finland, France, Italy, Hungary, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom, Norway, Switzerland, Turkey and Bosnia and Herzegovina. The Joint Research Centre of the European Commission is also eligible to participate.

²⁵ Decision of the European Parliament and of the Council of 16 September 2009

²⁶ Decision of the European Parliament and of the Council of 15 May 2014

²⁷ Decision of the European Parliament and of the Council of 16 September 2009

strengthen the European Research Area and help address societal challenges such as climate change, health and energy by focusing on seven broad fields (Targeted Programmes). Expected outcomes are detailed below for six of them (see Table 1), the 7th one (called “Open Excellence”) not having a sector-specific theme but focusing on new techniques through research excellence.

Table 1. Expected outcomes of the EMRP Targeted Programmes

Targeted Programmes	Expected outcomes
1) <i>Energy</i>	Improved measuring techniques towards a sustainable, low-carbon and secure energy supply across Europe
2) <i>Environment</i>	Improved measurements of pollution and regarding climate change for improved models and new policies
3) <i>Health</i>	Improved medical diagnosis and treatments through improved and new measuring techniques
4) <i>Industry</i>	Improved traceability of industrial processes for optimization, improvement, safety and innovation purposes
5) <i>New Technologies</i>	Improved and new measuring techniques to support innovation and improvement of new technologies
6) <i>SI Broader Scope</i>	Redefinition of the kilogram and updating of the other SI units towards their dissemination and application

Source: Brochures presenting the projects under each Targeted Programme

EMRP funds two types of activities: joint research projects (JRP) and associated researcher grant schemes within the seven Targeted Programmes (see Table 2).

Table 2. Type of activities funded by EMRP

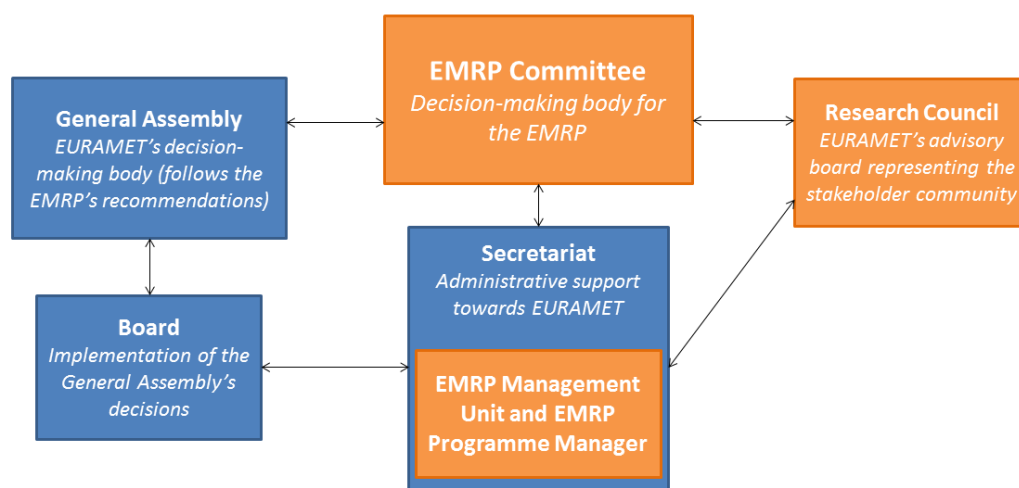
Activities	Description
1) Joint Research Projects	Core activity of the EMRP: selection of transnational projects by an independent panel from outside the NMI/DI community and execution mainly by NMIs/DIs
2) Grant Schemes	Researcher Excellence Grants: increased participation of the wider research community in JRPs
	Researcher Mobility Grants: capacity building of individual researchers
	Early-Stage Researcher Mobility Grants: support of young researchers

Source: EMRP Mid-Term Report 2012

2.3 Governance structure

EURAMET e.V., a non-profit association established in 2007 under German law, brings together all 37 European National Metrology Institutes. It is the legal entity that was in charge of the implementation of the EMRP. Strategic decisions regarding the programme were taken by the EMRP Committee (which is now the EMPIR Committee). This Committee was supported by a Secretariat and advised by a Research Council (see Fig. 1).

Figure 1. Governance model of the EMRP



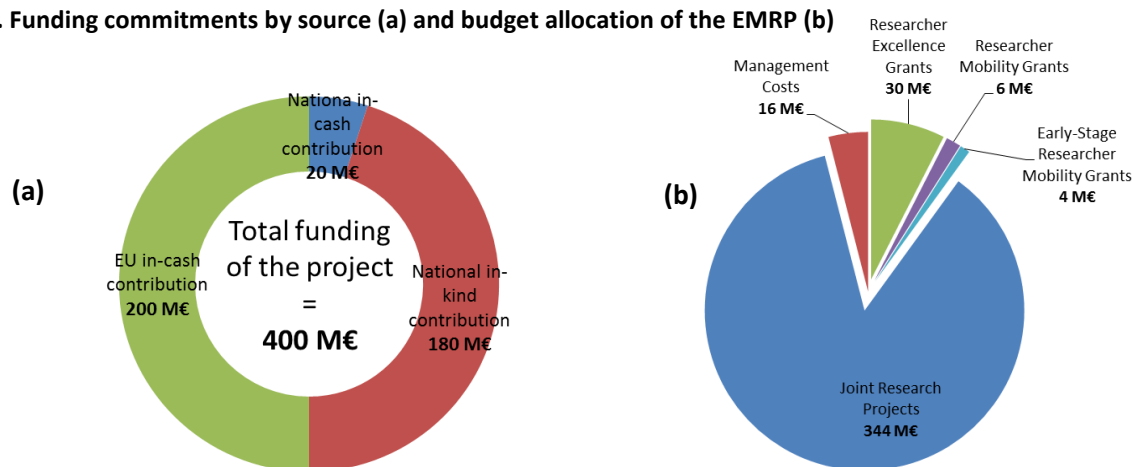
Source: EMRP website

2.4 Approximate resources and time needed for implementation

In line with the application of Article 185, each participating State committed **national resources** towards the funding of the EMRP, amounting to a collective contribution of 200 M€ over a seven-year period. In addition, another 200 M€ was **co-funded by the European Commission**, hence providing a **total budget of 400 M€**.²⁸

National funding commitments include an in-cash allocation (10%, or 20 M€) towards a real common pot covering (i) the total management costs of the programme (16 M€) and (ii) a share of the researcher grants' total value (4 M€). The remaining, more substantial part of national in-kind contributions (90%, or 180 M€) are provided through **institutional funding (in-kind scientific capacity)** by National Metrology Institutes and Designated Institutes towards a virtual common pot dedicated to the Joint Research Projects' activities. The initially planned allocation of funding towards the EMRP's activities is detailed below (Fig. 2). The important divergence across national contributions is noteworthy: in particular, Germany and the UK have provided over 60% of the in-kind funding while seven countries have contributed less than €1 million.²⁹ Required human resources are highlighted in Annex 2.

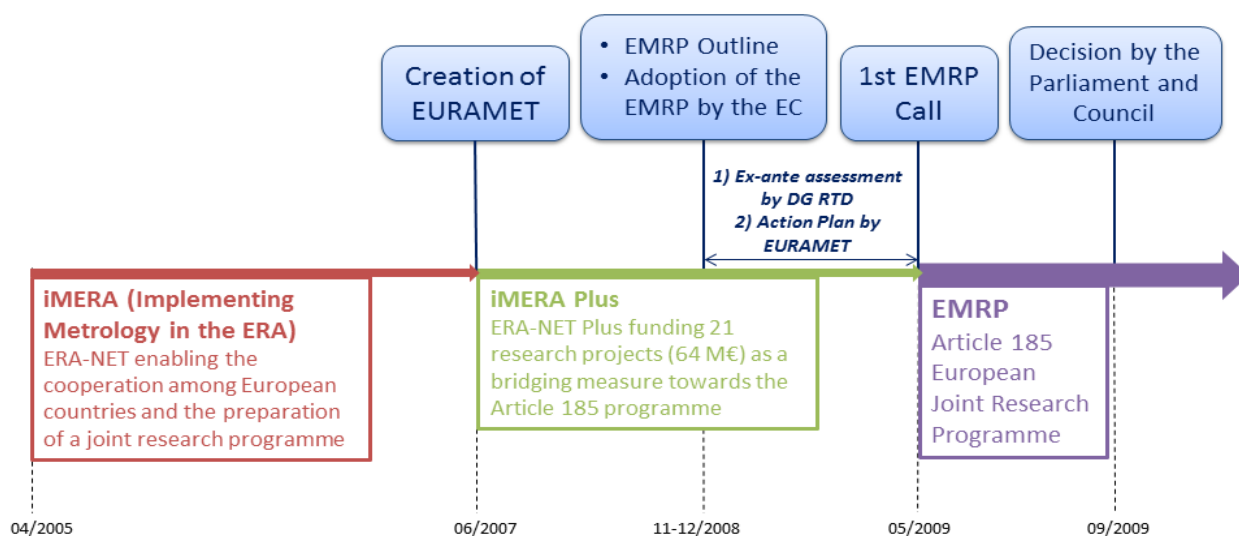
Figure 2. Funding commitments by source (a) and budget allocation of the EMRP (b)



Source: EMRP Outline 2008

In terms of the time needed for implementation, it is important to note that a **preparation phase of 4 years was necessary** in order to strengthen coordination among European countries and launch the EMRP (see Fig. 3).

Figure 3. Timeline for implementation



Source: EMRP Mid-term Report 2012

²⁸ Member-states with lower national resources were able to tap into a reserve in order to ensure the funding of their selected researchers within EMRP projects if the national contribution was insufficient. 19 M€ were used out of this reserve during the EMRP funding period.

²⁹ EMRP Mid-term Report 2012

3. Principal outputs to date

The EMRP has, via its seven Targeted Programmes (TP), greatly contributed to advancing European knowledge and techniques in metrology. The Targeted Programme on Energy is the most advanced one (see Box 2, Annex 2). Two-thirds of the EMRP projects are still on-going. So far, the EMRP has allowed to finance and support:³⁰

- 119 research projects involving 59 NMIs and DIs from 23 EMRP member-states as well as NMIs and DIs in other European countries and globally, over 350 academic groups and over 300 industrial participants
- An average participation of more than 10 organisations³¹ from 8 different countries³² within each Joint Research Project
- 377 associated researcher grants with a total value almost equal to the planned budget (40 M€)
- 998 peer-reviewed publications, a third of which are co-publications
- Almost 4000 conference presentations, over 1600 other dissemination activities and nearly 800 trainings
- Contributions to 739 standards developing committees (such as CEN, CENELEC, ISO)
- 36 patent applications
- €9 million sales of innovative products and services to date associated with the projects from the 2009 Energy Call (figures for more recent calls are not yet available)

4. Overall strengths of this tool, including key achievements

The Article 185 instrument/ EMRP offers many benefits as it allows to deepen alignment at strategic, operational and financial levels amongst participating countries.

4.1 *Strong alignment at strategic level via the elaboration of a common European vision and research agenda*

Firstly, the EMRP has helped participating countries develop a common vision for the development of European metrology research by encouraging regular interaction and meetings between NMIs, e.g., to prepare jointly strategic documents, such as the EMRP Outline. The elaboration of this Common Vision has also been facilitated thanks to the fact that EMRP could build on a historical network in the metrology community³³: NMIs are part of the infrastructure of states as they hold national standards. They have similar core missions, objectives and needs. In particular, they contribute to the international harmonisation of standards, which makes it easier for them to cooperate and align their work at an international level.

The EMRP has also had a positive impact on the alignment of diverse national strategic research priorities in the area of metrology, thanks to effective discussions aimed at identifying common research priorities and the development of a joint strategic research agenda. The EMRP has also subsequently allowed participating countries to align their own national metrology-related programmes with the EMRP (joint) priorities. In this regard, the EMRP Mid-Term Report 2012 states that *“there are some indications of alignment between larger countries and smaller countries that have scientific excellence in niche areas”*.

4.2 *Strong operational alignment thanks to programme integration*

Strategic alignment through the EMRP has in turn helped reduce fragmentation and duplication and has fostered critical mass: this large-scale and long-term joint research programme has created a broad, structured and strong core for the European Research Area in the metrology field. The joint efforts of participating NMIs and the large diversity of topics addressed by the EMRP have enabled participating countries to achieve results that would have been out of reach at the level of individual NMIs (see Sections 2.2 and 3). For example, their contribution towards international standardisation activities and patent registrations would not have been as significant without this large-scale cooperation.

³⁰ EMRP Data Summary (January 2016)

³¹ Impact Assessment Report 2013

³² EMRP Mid-term report 2012

³³ The international Metre Convention signed in 1875 created the International Bureau of Weights and Measures (BIPM), allowing member states to discuss and agree on common issues related to measurement units.

The EMRP has also facilitated alignment at operational level thanks to the establishment of a **central management structure** for the research programme with an integrated reporting system, the joint programming and implementation of research projects and the set-up of a central evaluation and selection process (an independent panel assesses the project proposals; see Annual Call Process in Annex 3). For instance, reporting requirements associated with national EMRP funding contracts were often simplified compared to other research projects. National in-kind funding for the EMRP did not trigger additional reporting requirements at national level. Moreover, EC reporting procedures were taken care of by EURAMET and not at the level of individual research projects. Effective knowledge-sharing among partners during Joint Research Projects and a greater collective openness to the wider scientific community through the joint selection of external experts and scientists (i.e. academia and industry) have also led to a strong added value of the EMRP for operational alignment.

4.3 Strong financial alignment amongst EU/Associated Member-States

The use of the Article 185 has enabled **long-term and substantial national funding commitments**, leading to strong financial alignment. Indeed, **about 50%** of national resources dedicated to metrology research in European countries have been engaged towards the EMRP. This is a significant amount bearing in mind that national in-kind contributions generally originate from the national budget for NMIs and not from larger national research funds.³⁴

4.4 Increased research capacity and excellence across Europe

European research capacity and excellence in the field of metrology have increased through the EMRP thanks to:

- The development of **new expertise** and strengthened existing expertise through the adoption of a transnational and multi-disciplinary approach: for instance in the field of health, less advanced NMIs have benefited from joint collaboration on EMRP research projects and thereby increased their knowledge and research capacity; also, new metrology options were developed, in particular related to the fields of biology and chemistry while measurement techniques were mainly oriented towards physics in the past.
- The participation of external researchers and experts through EMRP Researcher Excellence grants;
- A better coordination and sharing of the use of NMI infrastructures; and
- Staff exchanges between participating NMIs, thanks to EMRP mobility grants.

4.5 Enhanced interaction with end-users

The EMRP seeks to respond to the needs and requirements of end-users (e.g., industry, policymakers, standards developing organisations) by involving them in the selection of research topics and projects and the elaboration of calls: for example, EURAMET invited relevant Standards Developing Organisations to express their requests on the occasion of the EMRP Energy and Environment calls of 2013, leading to the funding of ten Joint Research Projects responding to those needs.³⁵ Similarly, this co-selection and prioritisation process with end-user communities triggered the shifting of €3 million from the Environment call to the Industry call in 2010 and €2.5 million from SI to Health in 2011.³⁶

Likewise, NMI metrologists have been encouraged to get involved in end-user organisms (e.g., by becoming members of institutions and committees dealing with regulatory and standardisation issues) in order to ensure an efficient dissemination of results and quick uptake of new techniques and technologies.

4.6 Increased visibility on the European and international scene

The EMRP network – and more broadly the EURAMET network – is often considered as the principal **European actor** in the metrology research field and can in turn collaborate more easily with other metrology communities globally, as opposed to individual European countries/ institutes. Indeed, EURAMET has been defined as the Regional Metrology Organisation of Europe.³⁷ The involvement of 48 countries worldwide³⁸, and more specifically

³⁴ As the EMRP has chosen to focus on a specific scientific community, namely NMIs, possibilities for further increasing financial integration may have been limited.

³⁵ EURAMET Strategic Research Agenda (March 2016)

³⁶ EMRP Mid-term report 2012

³⁷ <http://www.euramet.org/about-euramet/>; see Annex 1.

of non-European countries as *unfunded* partners or collaborators, demonstrates the added value of participating in such an internationally recognised programme and increases the international visibility of the EMRP.

4.7 Proven sustainability

The EMRP is a long-term initiative which can demonstrate its advantages in integrating large funding resources over time (eight years). The EC has supported the programme through a significant financial contribution, and has agreed to support its successor programme (EMPIR) by an even more important contribution (300 M€) which ensures the renewal of national funding commitments required for such a centralised joint programme over an even longer period of time (300 M€ over 10 years, compared to 243 M€ of national commitments over 9 years for the IMERA-Plus and EMRP). Furthermore, the EMRP has facilitated collaboration amongst (past, existing, future) project partners through its annual call procedure, which consists in (i) jointly setting research priorities through submitted research topics, then (ii) selecting research project proposals through a centralised evaluation procedure and finally (iii) awarding researcher grants (see Annex 3). The joint preparation of proposals for research topics (i) starts long before the official selection of research projects: potential research topics to be submitted are carefully agreed on at national level (within the research implementing organisation) and can be combined with other research topics identified by other countries in order to submit a proposal for a research topic co-authored by several European partners (i.e. NMIs, academia and stakeholders). Thus, strong European coordination is already observed at an early-stage within the metrology community. Similarly, the partnerships built through EMRP projects are **long-lasting after the end of the project** as the timeframe of the EMRP calls and projects allow to design follow-up projects and hence build on existing partnerships.

5. Overall limitations with this tool, including difficulties encountered during implementation

The weaknesses listed below³⁹ were partially addressed by the new Article 185 EMPIR (see Box 1, below).

5.1 Complex and time-consuming grant application procedures

As expected for such a research programme, grant application procedures are often considered to be too cumbersome and time-consuming. Two reasons can explain this weakness: firstly, while having a beneficial structuring effect, the elaborate 3-step annual joint programming procedure involves the submission of three proposals for each annual call (one for the research topic, one for the project proposal and one for researcher grants); secondly, the EU co-funding has implied the application of additional EU Framework Programme 7-related procedures. The heavy administrative procedures of the EMRP hence represent a significant hidden cost for NMIs.

5.2 Limited use of EMRP grants by the wider scientific community and end-users

The desire to broaden the orientation of EMRP projects to the wider scientific community and hence increase the potential scope of operational alignment in the metrology field initially faced a structural barrier during the first two years of the EMRP in that external researchers had to participate as individuals (researchers had to quit their job within their organisation to be able to fully dedicate their time to the EMRP). To offset this weakness, the EMRP redesigned its researcher grant scheme: a new form of Research Excellence Grant (REG) was put in place, allowing not only individual researchers but also organisations (e.g., firms, universities) to apply for REGs and receive funding for their contribution towards the EMRP. This resulted in a significant increase of the use of REGs and hence an enhanced openness to external researchers and experts.

5.3 Hindered transdisciplinary approach due to the organisational structure of National Metrology Institutes

The EMRP's desire to adopt a transdisciplinary approach ("Grand Challenges") was hindered by the historical organisation of research implementing agencies and consortia with limited interaction with other research fields. Moreover, a lack of inter-ministerial coordination and engagement with the NMI/DI community has been observed in some countries and impacted the interdisciplinary evolution of the EMRP, although ministries do not usually play a direct role as the funding for the EMRP comes from NMIs.

³⁸ EMRP Data Summary (January 2016)

³⁹ EMRP Mid-term report 2012

5.4 *Insufficient instruments for knowledge dissemination and transfer*

Although a majority of EMRP projects engage with end-user communities, specific instruments aimed at supporting the elaboration of new regulations and standards and the adoption of industry-led innovations have not been developed through the EMRP, thus diminishing the potential societal impact of EMRP project outcomes. The EMPIR nevertheless seeks to better address the issue of knowledge transfer (see Box 1 below).

5.5 *Relatively low involvement of less-advanced National Metrology Institutes*

EMRP grant schemes did not take account of the fact that less advanced NMIs often have few experts in a specific field and cannot afford sending them abroad (via an EMRP grant) for a long period of time. In the rare cases where such experts could be released, they could often not apply the skills and knowledge gained in the more advanced NMI due to a lack of facilities in their own NMI. Also, there was no dedicated EMRP mechanism to address the issue of low funding resources of smaller NMIs, for instance by facilitating their access to external funds and to leading NMIs' infrastructures. This hindered the participation of less advanced NMIs in the programme and contributed to widening the research gap between research intensive and less research intensive countries in the metrology area. This issue highlights the importance of encouraging infrastructure-sharing and joint training – issues which have been addressed in the EMPIR and more broadly by EURAMET.

Box 1. Focus on the European Metrology Programme for Innovation and Research (EMPIR), 2014-2020

The EMPIR Programme, launched in 2014, is a larger and more complex programme that is fully integrated in the EU Horizon 2020 Framework Programme and that takes account of the lessons learned from the EMRP experience. This renewed Article 185 initiative benefits from an increased total budget of 600 M€, including national commitments amounting to 300 M€ and a 300 M€ contribution from the European Commission.

As its predecessor, the EMPIR will continue to develop the “Grand Challenge” approach with annual calls addressing Targeted Programmes on Health, Energy, Environment and Industry, while also keeping one on Fundamental Metrology. A stronger focus has been put on **capacity building through specific tools**:

- the Targeted Programme “Research Potential” is specifically dedicated to capacity building within the NMI/DI community (e.g. through knowledge transfer to emerging members and smart specialisation);
- increased openness to external centres of excellence and 3rd parties and to the international metrology community will be fostered through their enhanced participation in EMPIR research projects (to be doubled compared to their participation in EMRP projects).

In addition, EURAMET will greatly support capacity building and networking activities when not directly associated with an EMPIR Joint Research Project through training courses and material, technical guides, and facilitated access to other funding sources such as EU Structural Funds.

Also, dedicated instruments for more **efficient dissemination and higher impact** have been put in place: Support for Impact Projects enable the further exploitation of outputs of Joint Research Projects (through new standards and regulations as well as knowledge transfer to businesses) and the pre- and co-normative Targeted Programme focuses specifically on standardisation activities to address the needs of the European and International Standards Developing Organisations for metrology.

Source: EURAMET Strategic Research Agenda (March 2016); EURAMET website; EMPIR Legislative Financial Statement

6. Conclusions: Suitability and key factors of success

The implementation of a long-term joint European research programme under Article 185 is most suited to respond to large-scale and common European challenges that require the mobilisation of a specific scientific community. This **political tool, which promotes “deep” alignment at strategic, financial and operational levels**, is relevant when there is a need for transnational uniform processes, standards and applications in a scientific field that is key to underpin advances in other scientific areas, as is the case for metrology. Thanks to its long-term duration and substantial budget, the Article 185 instrument allows for greater sustainability than other existing alignment modalities.

Key factors of success:

1) At strategic level:

- **Build on a pre-existing network:** A long history of collaboration among key research partners is crucial in enabling the transition towards a massive alignment initiative such as an Article 185 research programme.
- **Develop a common strategic research agenda**, which implies that strategic research priorities are defined in consultation with all relevant national representatives and with stakeholders and end-users to ensure relevance in addressing societal issues.
- **Establish a strong, centralised, clearly defined and legally binding governance model** through clear voting procedures and allocation of responsibilities, and a good balance between EC and national contributions (i.e., permanent staff and national representatives), which allows for joint discussion and effective agreement on and implementation of joint decisions.

2) At financial level:

- **Willingness to pool (significant) amounts of national resources over time:** The use of the Article 185 instrument is best suited for achieving this goal as it relies on high and multi-annual national funding commitments as well as a significant contribution from the EC. A **virtual common pot** for funding research is required when applying an Article 185 initiative as countries cannot risk losing such significant committed resources if the proposal selection does not lead to their participation in joint research projects. However, national contributions towards a real common pot are also of great added value in being independent from national funding rules, for instance, to cover for coordination and management costs.

3) At operational level:

- **Establish a central programme management** structure, supported by an integrated system for grant application and reporting activities.
- **Set up a centralised and independent evaluation system**, which engages with the wider scientific community to ensure research excellence, and with the end-user communities to ensure research relevance and societal impact.
- **Develop dedicated dissemination instruments for effective impact on end-users:** Enhanced interaction with stakeholders and end-user communities will facilitate effective dissemination and application of EMRP results by (i) involving them in joint research projects and (ii) involving project participants in end-user communities' activities.
- **Development of dedicated instruments for capacity building**, focusing on (i) involving the wider scientific community in order to benefit from their expertise and equipment; (ii) facilitating knowledge transfer and access to external funds and infrastructure for countries with lower national financial and human resources; and (iii) implementing training and networking activities and encouraging effective researchers' mobility.

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Interviews

Dr. Erkki Ikonen: EMPIR Committee Chair, Aalto University, Metrology Research Institute, Finland

Dr. Duncan Jarvis: EMRP Programme Manager

Dr. Jörn Stenger: National representative for Germany on the EMPIR Committee and former EMRP Committee Chair, Physikalisch-Technische Bundesanstalt (PTB), Germany

ANNEX 1. EURAMET⁴⁰

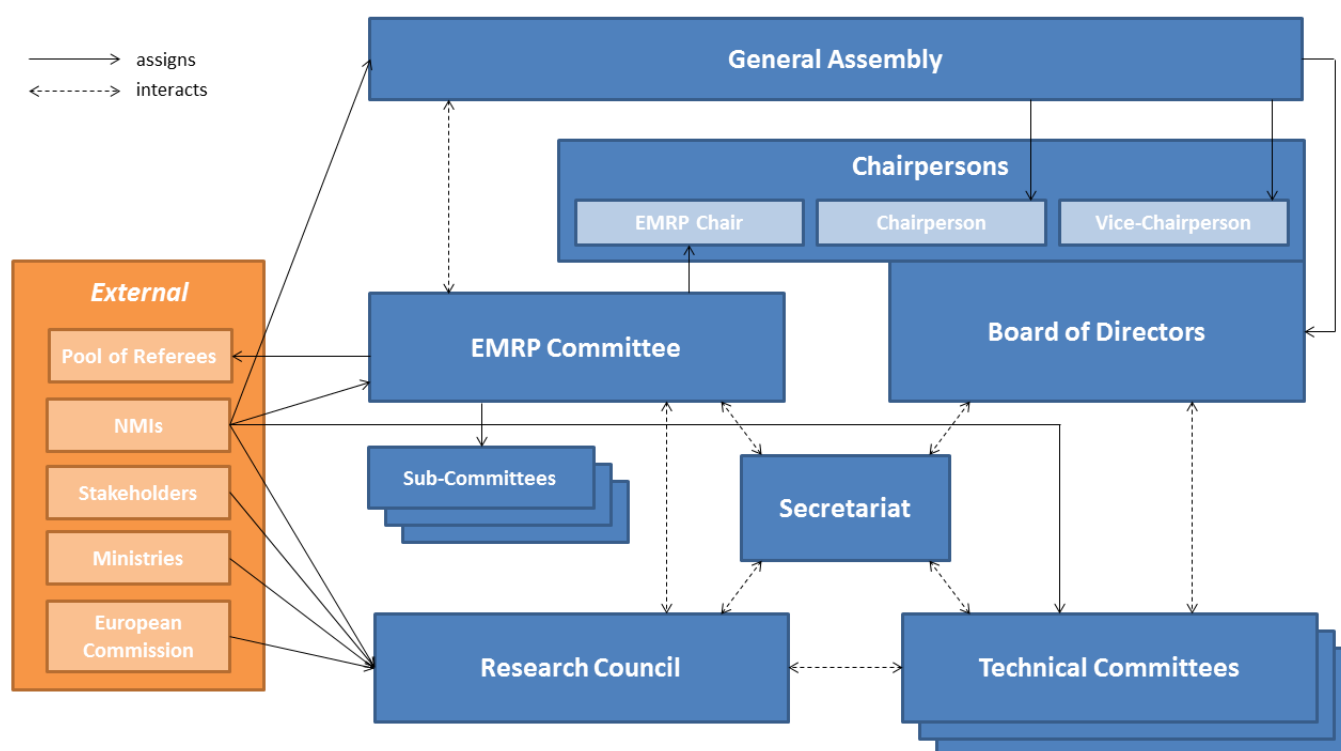
EURAMET e.V., the European Association of National Metrology Institutes, is a non-profit association under German law which was established on 11th January 2007 in Berlin. The association is the successor of EUROMET (European Collaboration on Measurement Standards), the former Regional Metrology Organisation of Europe, which included all EU NMIs and also NMIs from non-EU member countries and was dissolved in June 2007 after having transferred all its activities to EURAMET.

In order to foster knowledge transfer, support policy- and innovation-relevant research, encourage the alignment of national research programmes and enhance the development of national metrology infrastructures, EURAMET brings together and coordinates the cooperation of all 37 European NMIs on metrology issues such as research in metrology, traceability of measurements to the SI units, international recognition of national measurement standards and related Calibration and Measurement Capabilities.

EURAMET is the legal entity in charge of the implementation of the European Metrology Research Programmes, the EMRP and the EMPIR, which are the main tools developed in order to achieve EURAMET's mission.

The structure of the association has been carefully designed and implemented in order to fully achieve an efficient coordination among EURAMET members (Fig. 1). In particular, Technical Committees have been put into place in order to effectively address scientific and technical issues in the metrology area.

Figure 1. Structure of EURAMET e.V.



Source: *La métrologie française*⁴¹

EURAMET seeks to fulfil five strategic objectives⁴²:

1. Engage with key stakeholders: this goal should be achieved by developing key partnerships, understanding stakeholder needs, increasing the impact of EURAMET's own work and anticipating market and needs trends based on foresight analysis.
2. Increase its influence with European policy makers and National Governments: EURAMET is responsible for providing support for policy-making, especially where measurement has an important role in setting and/or implementing the policy.

⁴⁰ <http://www.euramet.org/>

⁴¹ <http://www.metrologie-francaise.fr/fr/activites-internationales/europe/euramet.asp>

⁴² EURAMET Strategy 2020; <http://www.euramet.org/about-euramet/>

3. Further develop co-operation in R&D: this is especially achieved through the development of the EMRP and the EMPIR and the associated implementation of Joint Research Projects.
4. Deliver high value to members and associates: EURAMET seeks to support all its members in achieving their own objectives by integrating them to overall European metrological needs and fostering cooperation, joint sharing of resources and infrastructure and involvement of key metrology players.
5. Support quality infrastructure in Europe and internationally: EURAMET aims at an increased cooperation with other relevant metrology organisms such as the CIPM MRA (Mutual Recognition Scheme supported by the Comité International des Poids et Mesures), the European Co-operation for Accreditation and other Regional Metrology Organisations.

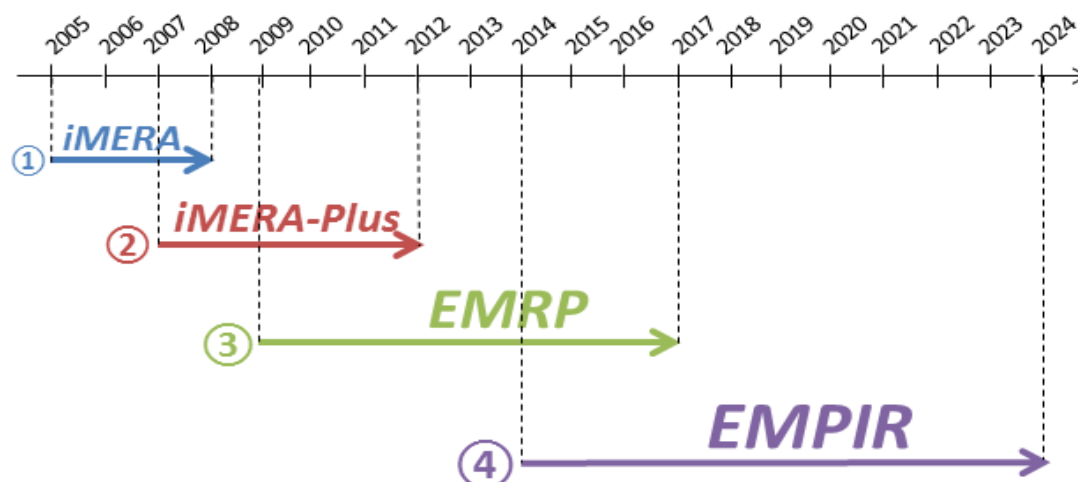
EURAMET VISION: *to ensure Europe has a world-leading metrology capability, based on robust and high quality science, and an effective and inclusive network based infrastructure to meet the rapidly advancing needs of end users.*

EURAMET MISSION: *(i) Develop and disseminate an integrated, cost effective and internationally competitive measurement infrastructure for Europe taking into account the needs of end users in industry, business and governments; (ii) Support members in meeting their own national requirements through collaboration and establishing a balanced European measurement infrastructure.*⁴³

⁴³ EURAMET Strategic Research Agenda.

ANNEX 2. STEPS INVOLVED IN THE IMPLEMENTATION AND EVOLUTION OF THE EMRP AND THE EMPIR

EURAMET e.V. was established in 2007 as the dedicated structure for the elaboration and implementation of a future European joint research programme on metrology, resulting from a pre-existing collaboration among EU countries and their associated NMIs.



① iMERA (Implementing Metrology in the European Research Area)

After the “Metrology in the European Research Area” study which examined the potential for top-level metrology in Europe, the ERA-NET iMERA was established in order to respond to the main outcome of this study, i.e. the need to increase collaboration amongst NMIs. It enabled a higher and more structured cooperation among European countries and the preparation of a joint metrology research programme.

② iMERA-Plus (Implementing Metrology in the European Research Area-Plus)

This ERA-NET Plus is considered to be the first phase of the European Metrology Research Programme (EMRP) before the actual implementation of the latter. It launched a call for joint research projects under the EU 7th Framework Programme, leading to the selection and execution of 21 3-year research projects with a total value of 64 M€. Funding resources from 19 EU countries were committed in order to finance these projects.

③ EMRP (European Metrology Research Programme)

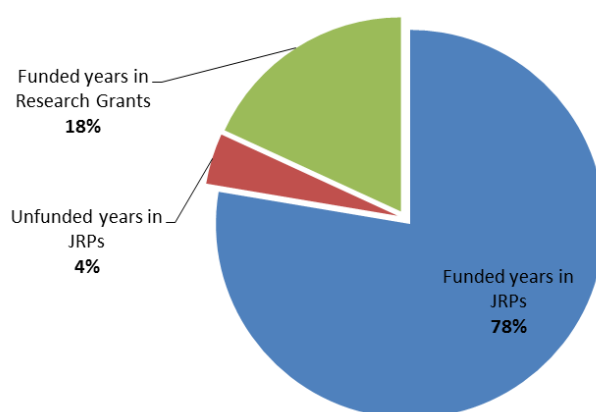
The EMRP was implemented by EURAMET as an Article 185 initiative and launched its first annual in 2009, which was followed by four other annual calls, facilitating the execution of 119 selected Joint Research Projects throughout Europe, each of them running for three years. The final projects from the 2013 Call are expected to report in 2017.

Each annual call addressed up to 3 different Targeted Programmes (see table below). Targeted Programmes such as the ones on Energy and Industry were associated to more than one annual call in order to enable the implementation of follow-up projects which could either deepen the results of the first project or facilitate their dissemination and application.

Year of Call	2009	2010	2011	2012	2013
Associated Targeted Programmes	<ul style="list-style-type: none"> • Energy 	<ul style="list-style-type: none"> • Industry • Environment 	<ul style="list-style-type: none"> • Health • SI Broader Scope • New Technologies 	<ul style="list-style-type: none"> • Industry • SI Broader Scope • Open Excellence 	<ul style="list-style-type: none"> • Energy • Environment

Researcher grants were allocated in order to contribute to the EMRP Joint Research Projects and allowed a high exploitation of **human resources** (see Fig. 1.) as funded person-years in research grants amounted to almost 20% of the total number of person-years needed for the implementation of the EMRP (i.e. 2725 person-years).

Figure 1. Human resources used during the EMRP



Source: EMRP Data Summary (extracted on January 26th 2016)

Box 2. Focus on the Targeted Programme Energy

The Targeted Programme on Energy, whose overall objective is to “establish the measurement infrastructure necessary to support Europe’s sustainable energy goals”, involved nine Joint Research Projects with a total investment of €32 million through its 2009 Annual Call. The projects were executed by 39 NMIs and DIs from 23 European countries as well as the NMIs from USA, Japan, Korea, Brazil and Australia: three projects were on sustainable energy, two on low carbon technologies and four on modernizing the electricity infrastructure. Strong engagement with end-users has been emphasized through these projects.

Key achievements	Key figures
<ul style="list-style-type: none"> • Supporting innovation in measurement technology by: <ul style="list-style-type: none"> - Future-proofing Europe’s gas networks - Developing next-generation nuclear energy - Supporting energy savings through the improved monitoring of power plant processes - Developing smart electrical grids by providing new calibration techniques and stability monitoring - Supporting energy harvesting in the automotive industry • Supporting standardisation for sustainable energy thanks to: <ul style="list-style-type: none"> - New regulations supporting the adoption of Liquefied Natural Gas - New standards on LED lighting guaranteeing a safer and more efficient electricity supply - A new standard supporting the biofuel-ready vehicles - New standards for cost-effectiveness of biogas - New standards for digital data in the nuclear industry 	<ul style="list-style-type: none"> • 15 academic research groups involved • 20 businesses from the energy and instrumentation sectors • 164 articles in peer-reviewed journals • 504 presentations at conferences and 28 presentations at workshops and seminars • 71 articles in the trade and popular press and 6 media interviews • 43 published newsletters and popular press releases, EURAMET website • 127 contributions into 67 technical committee and working groups • 2 patent applications • €9 million sales of innovative products and services to date • 8 contributions to standards

Source: Energy Impact Report (2016)

④ EMPIR (European Metrology Programme for Innovation and Research)

The EMPIR is the successor of the EMRP and focuses on enhancing interactions with centres of excellence and end-users to increase the impact of its work. Capacity building is also an EMPIR priority for better involving less research intensive countries. The Targeted Programmes covered by the annual EMPIR calls are given below.

2014	2015	2016	2017	2018	2019	2020
<ul style="list-style-type: none"> • Industry • Research Potential 	<ul style="list-style-type: none"> • Health • SI 	<ul style="list-style-type: none"> • Energy • Environment 	<ul style="list-style-type: none"> • Fundamental • Industry 	<ul style="list-style-type: none"> • Health • SI 	<ul style="list-style-type: none"> • Energy • Environment 	<ul style="list-style-type: none"> • Fundamental • Industry

ANNEX 3. EMRP ANNUAL CALL PROCESS⁴⁴

The five annual calls of the EMRP were all implemented through a 3-stage procedure.

Stages	Description
Call preparation <i>Defining the call scope</i>	The scope of the call is defined on the basis of the EMRP Outline and thanks to consultations with different stakeholders (European Commission, European Standards Organisations, Industry, etc.). It is approved by the EMRP Committee.
Stage 1 <i>Identifying metrological challenges</i>	This first stage is a call for Potential Research Topics (PRTs) which allows the EMRP Committee to identify and prioritize the most important research topics and analyze the available resources to address these topics. Any person or organisation can submit a PRT; its selection relies on its relevance regarding the scope of the call and societal needs, and on its demonstration of available expertise and infrastructure. The EMRP Committee approves a list of selected research topics which serve as a basis for the following call for proposals for Joint Research Projects.
Stage 2 <i>Selecting Joint Research Projects</i>	Proposals for Joint Research Projects (JRPs) are evaluated by a group of independent referees selected from the EU 7 th Framework Programme according to the following criteria: (i) scientific and/or technical excellence, (ii) relevance to EMRP objectives, (iii) potential impact and (iv) quality of management. A Review Conference gathers all referees and potential JRP-coordinators, enabling a common scoring procedure by referees and resulting in the approval of a single ranked list of projects. Researcher Excellence Grants (REG) can be directly associated to a JRP proposal during this stage.
Stage 3 <i>Selecting Researcher Grants</i>	Researcher Excellence Grants and Researcher Mobility Grants (RMG) can be provided once the selected JRPs are known and are necessarily associated to a specific JRP. JRP-coordinators provide the EMRP with adverts for specific desired researcher grants, which are then published as the call is launched. REGs can only be attributed within the wider non NMI/DI research community while both EMRP participating and non-participating countries can benefit from RMGs to increase capacity building within their metrology research activities and expertise. Researcher Grants are also evaluated by the group of independent referees.
Open Call <i>Supporting young researchers</i>	This Early-Stage Researcher Grant (ESRMG) scheme seeks to support early-stage researchers in travelling from one JRP-partner to another and encourage them to carry out additional research activities complimenting the considered JRP (contribution towards travelling fees, accommodation, etc.). It is open during the entire period covered by the EMRP Programme.

⁴⁴ EMRP Call Process (2011); http://www.emrp-online.eu/downloads/emrp_background.pdf



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.3- The ERA-NET Plus Infravation

Due date of deliverable: April 2016

Actual submission date: July 2016

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that supports greater alignment of research activities, namely the ERA-NET Plus Infravation (2014-2018), which is a transnational joint call for research proposals in the field of road infrastructure that relies on a **“real common pot” funding mechanism**. This ERA-NET Plus (European Research Area Network – Plus) has adopted a **delegated funding, coordination and management model**. While focussing on the specific experience of Infravation, the case study also provides lessons for other public-to-public research partnerships wishing to develop a similar approach to finance a joint call via a real common pot, and promote greater alignment of research programming more generally. The case study does however not aim to provide an in-depth assessment of Infravation nor of the real common pot approach.

The study highlights Infravation’s many benefits. The application of a real common pot approach has facilitated greater **financial alignment** across participating countries and allowed to fund the maximum number of research projects irrespective of the applicants’ nationalities and regardless of the objective of fair return on investment at national level. This innovative funding mechanism has also promoted stronger alignment at the operational level through (i) the appointment of a central funding and management body; (ii) the set-up of standardised and centralised programme-related procedures; (iii) the creation of new common selection criteria and general conditions specific to this ERA-NET Plus in line with FP7 requirements (especially funding and legal rules and eligibility criteria); and (iv) the joint dissemination of project outcomes. Furthermore, the scoping study that preceded the launch of the call as well as the preceding Transnational Road Research Programme carried out amongst National Road Authorities allowed to identify and define common research priorities amongst prospective participating countries. Infravation has also fostered synergies with other related EU and international research programmes and networks, and promoted alignment beyond the EU by involving a third country. Lastly, selected Infravation joint research projects support market-ready research to promote innovations.

Yet, the ERA-NET Plus Infravation has also been confronted with: (i) legal issues with call application procedures, due to EU legislation and the adoption of a real common pot, as this funding mechanism can go against certain national or regional funding rules; (ii) variations in the financial support received by selected applicants originating from countries outside the Eurozone; and (iii) a costly evaluation of pre-proposals (or so-called “light proposals”) due to the desire of applicants and of the Infravation team to provide excellent pre-proposals in order to demonstrate the effectiveness and quality of this pilot initiative.

The case study builds on the ERA-LEARN 2020 Task 4.1 (“Definition and Typology of Alignment”), and relies on a review of existing literature and targeted interviews with the Programme Coordinator of Infravation. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 “Assessment of Current Approaches to Alignment”. The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to Peter Wilbers (Infravation Coordinator, Rijkswaterstaat) for his valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific alignment modality, namely the ERA-NET Plus on Road Infrastructure Innovation entitled “Infravation”, which relies on **a real common pot** funding mechanism. The study assesses in what context such an approach is best used for promoting greater alignment of national research programmes and activities. While focussing on the specific experience of Infravation, it also provides **lessons for other JPIs and public-to-public research networks** wishing to develop a similar instrument to facilitate research cooperation and innovations amongst European researchers, and alignment more generally.

According to the Typology of Alignment (ERA-LEARN 2020 Task 4.1), the ERA-NET Plus tool is used for the organisation of a joint transnational call for research proposals in a field of common interest. It hence enables to generate **new transnational research in areas where there are research gaps**. This instrument mainly relies on alignment of national research programmes at the financial level as it particularly focuses on the funding stage of the research programming cycle and aims to advance transnational project cooperation. The different ERA-NET tools used under previous and current Framework Programmes (FP6, FP7 and H2020) are presented below in Annex 3.

Furthermore, the funding principle of a real common pot allows countries to **pool their national contributions into a common and centrally administered budget** via transnational flows of money. This mechanism provides funding for successful research proposals according to the total available budget (including the EC’s contribution) and **irrespective of the applicants’ nationalities**, hence independently of their countries’ contributions.

2. Key features of the ERA-NET Plus Infravation

2.1 Overview

The ERA-NET Plus Infravation (2014-2018) consists of a transnational joint call launched in March 2014, which aims to facilitate the **implementation of new international joint research projects in the field of road infrastructure** (e.g. pavements, bridges and tunnels).⁴⁵ It was initiated by two members of the Forum of European National Highway Research Laboratories (FEHRL): Rijkswaterstaat, which is an agency of the Dutch Ministry of Infrastructure and the Environment, and the Danish Road Directorate. The focus of the Infravation call is to support near-market ready research and hence lead to the demonstration phase of innovative products, technologies and services for road transport. The ERA-NET Plus brings together **11 National Road Authorities**⁴⁶, including from some non-European countries such as Israel (FP7 Associated country) and the USA, and benefits from a **financial support from the European Commission** (see Section 2.4).

The Infravation call addresses participating countries’ common needs for joint research and innovation on ‘*Advanced Systems, Materials and Techniques for Road Infrastructure*’⁴⁷. Participating National Road Authorities seek to overcome barriers to implementation of identified potential innovations in this particular field. More broadly, this ERA-NET Plus aims to support the EU Transport White Paper (2011) by helping **develop “a competitive and resource efficient transport system”**. It also supports the Horizon 2020 objective of “*Smart, green and integrated Transport*”⁴⁸, which promotes the **increase of (i) cost- and resource-efficiency, (ii) environmental performance, (iii) capacity of the transport system and (iv) transport safety**. Infravation has been designed to complement existing European research programme. Infravation encourages road innovations in the private sector while taking account of the needs of national public road authorities. It has the longer-term objective of developing a joint research programme gathering and linking all modes of transport.

2.2 Mission and activities

Infravation seeks to facilitate the development of “cost-effective advanced systems, materials and techniques in road infrastructure construction and maintenance, including repair, retrofitting and revamping”⁴⁹. The outcomes

⁴⁵ Infravation Guide for applicants (March 2014)

⁴⁶ Denmark, France, Germany, Iceland, Israel, Italy, Netherlands, Norway, Spain, Sweden and USA.

⁴⁷ SST.2013.1-3. ERA-NET Plus ‘*Advanced systems, materials and techniques for next generation infrastructure*’: <https://ec.europa.eu/research/participants/portal4/desktop/en/opportunities/fp7/calls/fp7-sst-2013-rtd-1.html>

⁴⁸ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/smart-green-and-integrated-transport>

⁴⁹ Infravation Scoping Document (February 2014)

of Infravation's selected joint research projects aim to benefit economic players in the field of transport and all current and future road users, by promoting innovations at local and international levels.

Infravation focuses on four main activities:

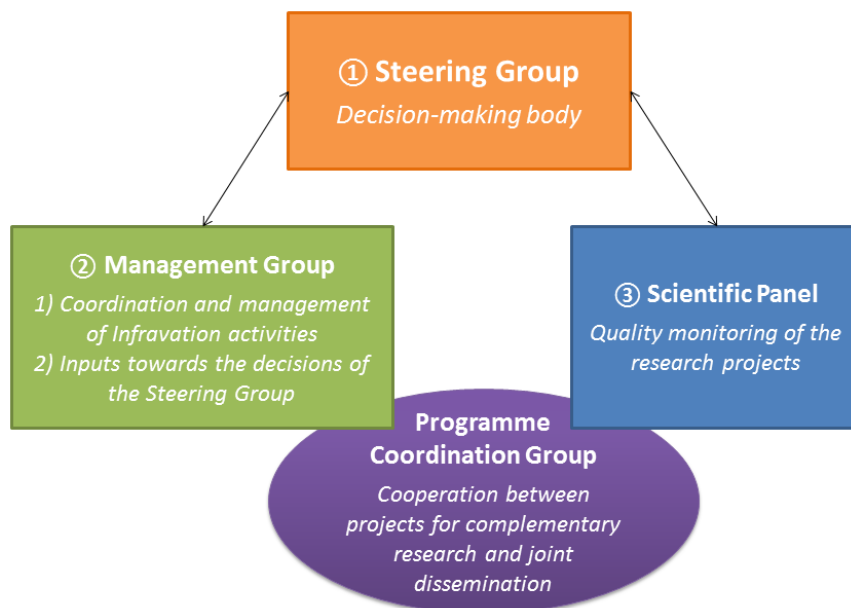
- 1) Preparation and launch of the 2014 Call for joint research proposals;
- 2) Evaluation of proposals and selection of joint research projects;
- 3) Funding and monitoring of selected research projects;
- 4) Communication, dissemination and application of project outcomes.

So far, it has successfully carried out the evaluation of proposals and the selection and launch of nine joint research projects. The first call for light proposals⁵⁰ led to the submission of 103 proposals with a total request for funding of 122.4 M€. During the second phase of the call, 23 research consortia then submitted full proposals. Considering the available budget, nine projects were ultimately selected for funding, with a maximum duration of 30 months each and an average budget of 1.1 M€.

2.3 Governance structure

Infravation is structured around three main bodies (see Fig. 1): 1) the Steering Group, which brings together all funding partners and is the highest decision-making body; 2) the Management Group, which is responsible for the day-to-day coordination and management of Infravation activities and advises the Steering group; and 3) the Scientific Panel, which is composed of independent experts who jointly provide technical advice regarding the projects. In addition, the Programme Coordination Group scientifically monitors the projects in order to foster cooperation and complementarity amongst them and promote joint dissemination of results. It is composed of the Work Package leaders responsible for the project selection and monitoring, the project coordinators and the Chair of the Scientific Panel.

Figure 1. Governance scheme of Infravation



Source: Infravation Description of Work

⁵⁰ Referred to as "pre-proposals" in several other ERA-NETs Plus.

2.4 Approximate resources and time needed for implementation

The uniqueness of Infravation's funding model relies in the implementation of a **real common pot** with central negotiation, funding and monitoring by **one single contracting and funding body**. This approach has rarely been used by other ERA-NETs Plus so far. Infravation's real common pot consists of national and EC in-cash contributions, of respectively 6.9 M€ and 2.675 M€, amounting to a total budget of **9.575 M€ which directly funds the activities of nine Infravation joint research projects**.⁵¹ **All other types of costs are covered by the partners themselves, with at least 1.5 to 2 M€ of national in-kind funding** (i.e. for programme management procedures, travelling, accommodation, organisation of events, etc.). It is noteworthy that the EC top-up mechanism does not apply to the US contribution (i.e. 1 M€): the EC funding corresponds to 33% of European *in-cash* national contributions (excluding the US contribution).

The budget needed for the implementation of Infravation (Fig. 2) highlights: (i) the adoption of a real common pot for research project activities (in green) and (ii) the required in-kind funding for coordination and management activities of Infravation as a whole (in blue).

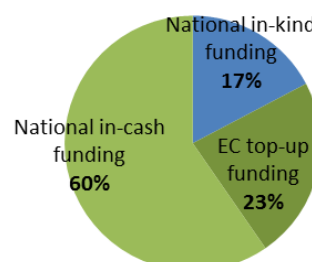


Figure 2.
Composition of
Infravation's
budget

Source: Interview

The timeline below (Fig. 3) indicates that a first research network on roads (ERA-NET Road) was set up by the Conference of European Directors of Roads (CEDR) and co-funded by the EC. Afterwards, approximately **three years were necessary to prepare the Infravation 2014 Call**:

- First, CEDR launched a transnational research programme, through which National Road Authorities gathered annually to define common research priorities and indicate the extent of financial contributions they could provide towards a real common pot supporting the launch of a joint call. The first two years of this programme served as a "trial" for Infravation.
- Second, a scoping study was carried out by experts in close collaboration with potential Infravation partners and stakeholders and the EC in order to jointly set more specific research priorities to be addressed in the Infravation Call. The scoping phase was facilitated by the organisation of workshops in participating countries and scanning tours (especially in the United States). The Infravation Scoping Document is the output of this scoping process.

Figure 3. Timeline for implementation



Source: Infravation Description of Work

⁵¹ Presentation Peter Wilbers Brokerage Event March 2014

3. Principal outputs to date

Infravation is a relatively recent ERA-NET Plus and all funded projects are still on-going. The expected key outcomes of Infravation research projects are listed in Annex 1 and demonstrate the potential for knowledge creation and innovation in the field of road infrastructure. So far, Infravation has organized several events: Road Infrastructure-Innovation Expo (June 2013), Call Information and Brokerage Event (March 2014), Kick-Off Meeting (November 2015). It has also participated in major scientific events in the field of transport and innovation.⁵²

4. Overall strengths of this tool, including key achievements

The ERA-NET Plus Infravation offers many benefits, especially as it has adopted a real common pot mechanism which facilitates an integrated and centralised approach to its implementation and management.

4.1 Financial alignment through an innovative central funding mechanism

The **real common pot** approach has enabled participating countries to **pool their resources in order to collectively tap into new innovations at a lower cost** than if they had had to do so individually at the national level. The use of a real common pot approach is particularly suited in the case of Infravation as it involves national road authorities as funding providers. Such agencies have a longer-term budget allocation compared to traditional research funding organisations (i.e. two to four years) and can better anticipate cash flows in the future. The real common pot approach offers many benefits:

- (i) It enables **full spending of the funding pot**: unlike a virtual common pot, there is no need to negotiate committed budgets at national level to fill in a potential resource gap associated with the lack of national funding of a research organisation, hence endangering the feasibility of a selected research project. With a real funding pot, a maximum number of joint projects are funded based on the total available programme budget and does not depend on the availability of national sub-budgets. Hence, the real common pot approach allows for the maximum use of national resources.
- (ii) Infravation's funding mechanism provides a **clear picture of the budgetary situation**: in the case of a budget raise, it is easy to know how much is available to fund additional projects (and if necessary, how much more should be negotiated to complete the budget). In case of a budget cut, it is also clear which projects will be impacted. Indeed, the real common pot approach allows to follow the ranked list of potential projects, as it is **independent from specific national commitments**. In the case of Infravation, the centralised negotiation for additional funding enabled to finance two additional projects, hence nine projects in total instead of only seven.
- (iii) **Infravation has allowed to go beyond the desire for a fair return on investment ("juste retour") at the national level**: compared to the virtual common pot approach, the return on investment per country is not visible and cannot be easily calculated. In fact, Infravation partners have agreed on a common goal, which is to aim for a **return on investment on total project resources**, and not on committed national budgets. This reflects their long-term shared interest, which is to collectively implement future procurement activities through joint infrastructure projects. Thus, Infravation projects serve as feasibility and demonstration tests for future common road infrastructures.

The implementation of Infravation's real common pot was made possible thanks to advanced collaboration and **time invested in discussing common benefits of adopting such an approach**. Indeed, discussions regarding this funding mechanism were initiated by ERA-NET Road (FP6 and FP7 ERA-NET) approximately four years before the official launch of Infravation. Persuading funding providers of going beyond a fair return on investment was particularly challenging. Hence, the leadership of a funding organisation that is strongly convinced of the benefits of such an approach is required in order to achieve such a change of mindset.

In practice, CEDR's Transnational Road Research Programme paved the way for Infravation as it served as a two-year trial for the organisation of transnational calls which relied on a real common pot and a "delegation coordination"⁵³ approach (see Section 4.2). Infravation has followed this successful example and is one of the first

⁵² Transportation Research Board Annual Meeting 2014-2015-2016, Transport Research Arena 2014-2016, FEHRL Infrastructure Research Meeting 2015, European Road Transport Research Advisory Council plenary meetings 2015-2016.

⁵³ Investments in JOint and Open REsearch Programmes and analysis of their economic impact (JOREP) – Final Report (2013)

ERA-NETs Plus to have implemented a real common pot with funding rules specific to the ERA-NET Plus. It hence consists in a pilot experiment. Infravation partners have collectively designed and agreed on *new common* funding rules which do not deal with national rules and suit the **profile of funding providers** (i.e. national road authorities, and not research funding organisations). In particular, established funding rules refer to procurements to invest in infrastructure, and not to subsidies for research which are governed at national level.

4.2 Centralised procedures and the “delegation of responsibility”

The existence of a real common pot also brings many benefits at the operational level. Indeed, the **delegation of responsibilities to a single entity** is a requirement when applying a real common pot. As Rijkswaterstaat was a driving force of the project, it was willing to cover most of the coordination and management costs through a significant in-kind contribution in order to demonstrate the effectiveness and benefits of such an approach. In particular, it was appointed as contracting and funding body. However, not all countries were initially favourable to this suggestion as this triggered money transfers across borders. A rigorous monitoring of the spent budget has been set up in order to regularly report to all partners and gain their trust on the use of the available funding. This has revealed itself to be very beneficial to the operation of the programme. Thanks to centralised and time-saving procedures carried out by Rijkswaterstaat, transaction costs related to programme management have been minimised at national levels. In particular, this “delegated” model has led to the establishment of only one funding contract per project instead of different national contracts for each country represented in a given project consortium. This has provided **greater simplicity and transparency** for project coordinators and applicants as the funding procedures are standardized and centralised for all participating countries. Also, Infravation has put in place an online tool which has facilitated not only the proposal submission, but also the evaluation and monitoring of funded projects.

The joint preparation of the call included the collective drafting of the Guide for Applicants, which was simplified thanks to the collective agreement on and adoption of new common general eligibility and funding criteria (see Section 4.1) which fully satisfied FP7 requirements. This allowed to address the problem of inter-operability, unlike in many cases where national rules also govern eligibility criteria for the funding of transnational research.⁵⁴ Regarding scientific expectations, clear guidance was also provided to applicants thanks to the advice of the Scientific Panel and the scoping efforts preceding the preparation of the call. The **effective dissemination of the call** was ensured by (i) a large advertisement amongst relevant European and international networks, stakeholders and research organisations, and (ii) the brokerage event organised during the launch of the call.

Infravation’s central selection process consisted of a two-step procedure with **common evaluation criteria and guidelines**. Hence, **countries waved off their national requirements for eligibility checks and evaluation of projects**. The first step of the evaluation of light project proposals was jointly led by national experts chosen by the Infravation Steering group members. The second step consisted in the assessment of full proposals of the projects which had been selected in the first phase. This evaluation was jointly carried out through peer-review by an independent panel of international experts, ensuring that no conflict of interests could interfere with the common evaluation of projects.⁵⁵ After an initial remote evaluation, international experts all gathered at a Joint Consensus Meeting facilitated by the Infravation Management Group in order to jointly establish a single ranking list of projects. This list was then validated by the Infravation Steering Group and the EC.

Regarding the monitoring of Infravation projects, a common set of procedures towards the central funding body has been put in place. There are no double reporting requirements at national level, hence substantially reducing the administrative effort of project coordinators and participants. The monitoring of the quality of projects is also continuously supervised by the Infravation Programme Coordination Group, which allows for synergies between projects and facilitates the coordination of the Infravation programme as a whole.

4.3 Facilitated joint knowledge transfer and dissemination of results

All project results will be accessible to Infravation funding partners for their own use. This collective agreement on **open access to Infravation results** will contribute to the overall strategic aim of reducing fragmented and duplicated research efforts at national level, and effectively implement transnational innovations. This is also

⁵⁴ Insufficient inter-operability between various national rules and procedures for funding and executing research has been identified in the Typology Report (ERA-LEARN 2020 Task 4.1) as a key challenge to alignment.

⁵⁵ The peer-review is a mandatory for ERA-NETs Plus and ERA-NETs Cofund.

consistent with the EC's strategic priority on "Open Science".⁵⁶ Moreover, Infravation has given priority to broad communication with stakeholders and the wider scientific community for effective dissemination and application of results (e.g. participation in standardization efforts, information and advice to policy-makers, establishment of new partnerships with road managers and especially with Small and Medium-sized Enterprises for the exploitation of innovations developed and demonstrated in Infravation projects⁵⁷). This is achieved in particular through major external conferences, national workshops jointly carried out, newsletters, the maintenance of a website and the publishing of articles (e.g. in FIRM).

4.4 Strong linkages with other research networks and programmes

Infravation has established a strong link with the EC in order to ensure the complementarity and avoid duplication with other FP7 and H2020 research projects. This is also fostered through significant interactions with Infravation stakeholders and other projects and associated programmes (e.g. CEDR, U.S. programme Every Day Counts). Infravation builds on and complements several related research networks, programmes and projects in order to foster synergies and build on their already existing transnational cooperation, especially as there is an overlap of partners with many related initiatives. For example, several countries involved in the Forever Open Road (FOR) Programme launched by FEHRL are also participating in Infravation.

Infravation also takes into account lessons learnt by the ERA-NET Road and by CEDR's Transnational Road Research Programme, in terms of alignment at strategic, financial and operational levels. Indeed, these networks are experienced in the implementation of transnational cooperation activities. Over time, they have elaborated best practices especially (i) for jointly defining common research priorities, (ii) applying a real common pot approach for the funding of research projects (see Section 4.1) and (iii) jointly disseminating outcomes. In addition, the ERA-NET Transport brings in its experience in implementing transnational calls on EC grant scheme as it is the founding father of many ERA-NETs Plus such as Electromobility+ and Infravation.

4.5 Promotion of alignment of research beyond the EU

The Infravation call is noteworthy as it involves the **participation of non-EU partners** such as Israel (FP7 Associated Country) and USA, hence contributing to the coordination of national research programmes beyond the EU. As a result, seven of the nine projects include U.S. participants, and three of them are coordinated by a U.S. entity.⁵⁸ More generally, the Infravation Consortium decided to also open the call to all EU27 and FP7 associated countries, increasing as such the international visibility of the programme.⁵⁹ As explained in Section 2.4, a scoping study had been carried out, which had led to the **joint identification of 7 transnational challenges** (see Annex 1) and the need for *transnational* collaboration to address them in an effective way.

4.6 Support of near-market ready research to promote innovation

Infravation promotes **scientific excellence** as its real common pot approach allows the best expertise to be used, regardless of nationality and potentially associated budget constraints. Moreover, the Infravation call seeks to **support transnational near-market ready research** in the field of infrastructure for road transport. This includes (i) laboratory testing of integrated systems (close to the potential system that would be marketed) in simulated environment, (ii) verification of prototype systems through a demonstration in an operational environment and (iii) removal of engineering or manufacturing risks for market uptake. Infravation hence facilitates the implementation of infrastructure related innovations resulting from associated research projects for road construction and maintenance. The call encourages innovations from the private sector as firms may have difficulties in allocating their resources to R&D projects while they are aware of the existence of a potential market for their newly developed technology or process.⁶⁰

⁵⁶ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/open-science-open-access>

⁵⁷ Infravation innovations could for instance be further developed via the EUREKA Eurostars programme which is dedicated to support R&D performing SMEs in developing marketable products, processes and services.

⁵⁸ FHWA R&T Now, November/December 2015

⁵⁹ Infravation Description of Work

⁶⁰ FIRM Issue 1 November 2012

5. Overall limitations with this tool, including difficulties encountered during implementation

As the Infravation programme has recently been launched, the main difficulties concern the first stage of its implementation, which pertains to the application procedures and the funding and selection of projects.

5.1 *Legal issues with EC application procedures and the real common pot approach*

Grant Agreements established with selected project consortia and related general conditions are based on EU law in order to guarantee eligibility for EC top-up funding. However, this can lead to legal difficulties when these general conditions do not suit national rules of other participating countries. In the case of the US, some applicants were hindered in their application procedure. Eventually, only one project was really problematic as it could not be coordinated by a US coordinator. A coordinator from another country had to be chosen.

This type of difficulty can be avoided thanks to clearer communication from the Infravation research project coordinators to their consortium partners from the very beginning of the application procedure (especially with participants from non-EU/non-Associated countries). Indeed, the initial negotiations are focused on the content of the proposals. The legal issues were addressed later, which increased the risk of encountering major hurdles at the very end of the negotiation and consortium building process.

Furthermore, some countries or institutions required the demonstration of fair return on investment at national/regional level, which goes against the principle of a real common pot. In most instances, the creation of new funding requirements specific to the ERA-NET Plus Infravation enabled to address this problem (see Section 4.1). However, one applicant from a Spanish region could not participate in the end because this funding mechanism was explicitly not allowed by regional rules and this issue could not be worked around. In addition, the EC top-up mechanism, which is based on the virtual common pot approach, seemed not entirely suited to the real common pot approach.

5.2 *Variation in the financial support for non-Eurozone project partners*

The depreciation of the Euro vs. the US Dollar de facto meant that some US project partners suffered from significant budget cuts. Indeed, the US applicants' initial request for funding was in Euro yet the funding received in Euros and then converted into Dollars was lower than the initial estimation.

5.3 *Costly evaluation of light proposals*

The evaluation of light proposals cost similar efforts as for full proposals due to demanding requirements, which included relevance and quality of the proposal and of the Consortium as a whole, technical capacity, competence and financial and legal eligibility of applicants⁶¹ (See Section 2.2 for call process). However, it should be reminded that Infravation is a pilot programme, which means that applicants and Infravation partners were keen to have excellent light proposals in order to increase the chance of obtaining a top-up EC funding. The Infravation team and applicants also had to convince national funding providers of the quality of the programme and associated programmes in order to benefit from their financial support. This initial negotiation procedure can only occur during the first phase of the call (i.e. at the light proposal stage), which means that the light proposals were indeed more detailed than typical light proposals. Now that Infravation has proven the effectiveness of its selection process, it has gained trust from national funding providers and the EC. Hence, the up-scaling of such a programme would probably be less challenging in terms of requirements for light proposals.

⁶¹ Infravation Description of Work

6. Conclusions: Suitability and key factors of success

The central common pot approach for the funding of transnational research activities allows to pool national financial contributions and to optimally use the latter towards the implementation of a common transnational research programme. It can also be applied for larger budget volumes. It is in fact the only funding mechanism which enables full spending of the available national financial contributions hence allowing to fund the maximum number of joint research projects, **regardless of commitments at national level**. In addition, it allows to **lower transaction costs** thanks to centralised programme and project management. The **profile of the funding providers** greatly influences the feasibility of adopting a real common pot approach. In addition, the **pre-existing cooperation** between involved partners is vital to the success of this approach in order for them to realise the benefits of going beyond the notion of “juste retour”.

Key factors of success:

1) At strategic level:

- **Clearly define the scope of the call** by building on networking activities and jointly identify **common research priorities**. This scoping process enables partners to identify specific needs for transnational cooperation and provide clear guidelines to applicants regarding scientific expectations.
- **Build on already existing research and innovation projects, programmes and networks**: beyond the scope of the call, this allows to identify relevant stakeholders to be involved in the programme and to effectively foster meta-level cooperation and strategic alignment across various related initiatives, hence contributing to strengthening the European Research Area.

2) At financial level:

- **Establish the conditions for the acceptance of a real common pot approach** (e.g. trust building, past cooperation, common understanding of the benefits of such an approach, etc.).
- **Build on past experience in the use of a real common pot**: best practices developed regarding this approach support the joint definition of a centralised funding mechanism.
- **Appoint a single contracting and funding body and define common funding rules which suit the profile of national funding providers**: this is essential for the application of a centralised funding distribution. In particular, this allows to overcome inter-operability issues between national rules and provides greater simplicity and transparency for applicants and funding providers at national level.
- **Anticipate and clearly communicate about legal issues and general conditions** at the very beginning of the application procedure, especially regarding the adoption of a real common pot approach: this enables to avoid major hurdles for applicants, who need to comply both with national/regional and ERA-NET Plus/common pot rules.
- **Secure funding (in-cash or in-kind) for all management and networking costs**: these activities are essential for an effective centralised running of the programme.

3) At operational level:

- **Implement a structured and centralised governance and management model** for efficient strategic decision-making and project management (centralised preparation of the call, proposal evaluation and project monitoring).
- **Facilitate an integrated coordination of projects** funded by the ERA-NET Plus in order to enhance synergies among projects of the research programme and with other related programmes or initiatives, and enhance the coherence and visibility of the transnational research programme as a whole.
- **Effectively disseminate project outcomes** and, particularly if the programme is focused on market-ready research, **timely anticipate the innovative solutions** resulting from the research and innovation projects by preparing organisations and structures that can implement and upscale them afterwards.

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- CEDR: <http://www.cedr.fr/home/>
- FASSTbridge: <http://fasstbridge.eu/>
- FEHRL: <http://www.fehrl.org/>
- HEALROAD: <http://healroad.eu/>
- Infravation: <http://www.infravation.net/>
- SEACON: <http://seacon.um-sml.com/>
- SeeBridge: <http://seebridge.net.technion.ac.il/>
- SUREbridge: <http://surebridge.eu/>
- TRA: <http://www.traconference.eu/>

Interview

- Peter Wilbers: ERA-NET Plus Infravation Coordinator (Rijkswaterstaat)

ANNEX 1. ADDITIONAL INFORMATION CONCERNING THE INFRAVATION CALL

Infraction has adopted a work plan which reflects the core objective of implementing a joint transnational call in compliance with EC's rules for ERA-NET Plus actions. The core activities are:

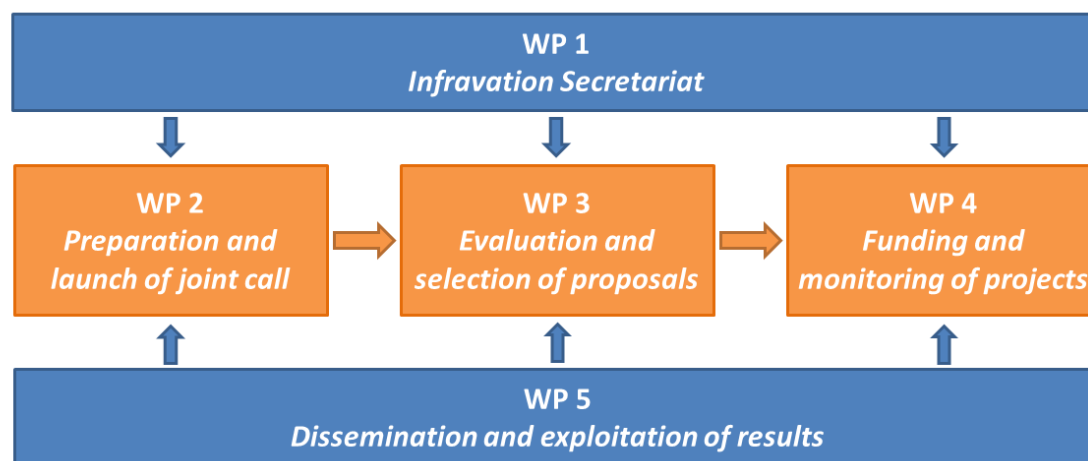
- Launch of the joint call including announcement (WP 2)
- Joint evaluation and selection of projects to be funded (WP 3)
- Joint monitoring of transnational projects (WP 4)

These are supported by two cross-cutting activities related to the joint call implementation:

- Dissemination and exploitation of results (WP 5)
- Infraction Secretariat (WP1)

Work Package 6 (Project Management) deals with management activities of the ERA-NET Plus call and the contractual and financial obligations related to the EC Grant Agreement.⁶²

Figure 1. Scheme of Infraction's work plan



Source: Infraction Description of Work

The submitted proposals were required to address at least one of the seven challenges identified thanks to the scoping study (see Table 1). Regarding the project selection (WP 3), the second evaluation stage was under the responsibility of an independent panel of international experts on road infrastructure innovation. A joint consensus meeting took place end of March 2014 in order for them to jointly evaluate and rank proposals. It was followed by the Infraction Steering Group meeting for the final approval of selected joint research projects.

Table 1. Infraction Challenges addressed by research projects (in red)

Challenges	Projects								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Advanced predictive infrastructure performance processes									
B. Enhanced durability and life-time extension									
C. Rapid and non-destructive methods for routine quality and performance checks of materials and construction									
D. Keeping freight routes open through zero-intrusive maintenance									
E. Ensuring infrastructure performance under all weather conditions									
F. Resource and energy efficiency in road construction and maintenance									
G. Virgin material reduction by substitution or recycling									

⁶² Infraction Description of Work

Source: Presentations of Infravation projects at the Kick-Off Meeting (November 2015)

The expected key outcomes of Infravation research projects are listed below (Table 1) and demonstrate the potential for knowledge creation and innovation in the field of road infrastructure.

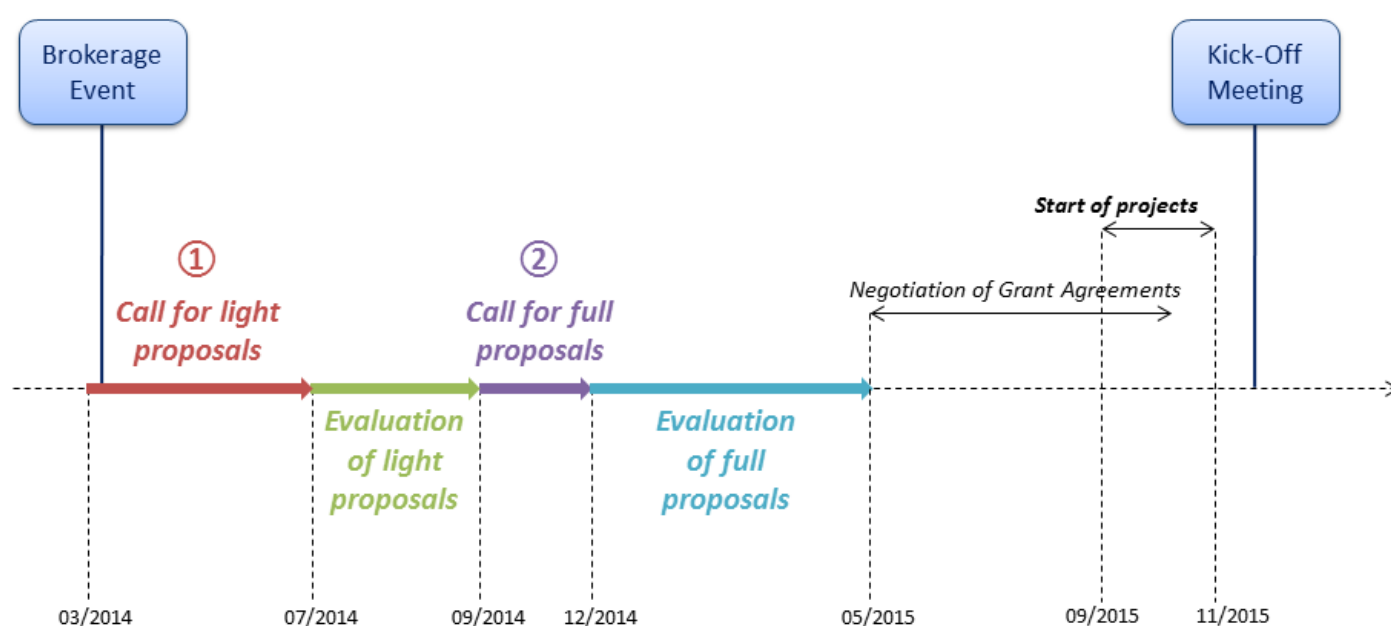
Table 2. Expected outcomes of Infravation projects

Project name	Main outcomes
(1) ALTERPAVE	Demonstration of the technical and economic feasibility of increasing the use of recycled materials, by-products and alternative materials for road pavements
(2) BIOREPAVATION	Demonstration of innovative recycling techniques of pavements by using alternative road binders made of bio-materials
(3) ECLIPS	Development of durability-enhancing components of concrete in road infrastructure by diminishing its sensitivity to varying temperature conditions
(4) FASSTBRIDGE	Development of a methodology to assess and prevent steel bridge fatigue and of a preventive strengthening system to extend life-time of steel-bridges
(5) HEALROAD	Development of a cost-effective self-healing technique to increase road durability
(6) SEACON	Demonstration of a sustainable technique for concrete production with seawater and salt-contaminated aggregates
(7) SEEBRIDGE	Development of a bridge information model which provides most of the information needed for decision-making concerning the repair, retrofit or rebuild of a bridge
(8) SHAPE	Development of a long-term monitoring device of bridges through non-destructive testing
(9) SUREBRIDGE	Improvement and demonstration of a refurbishing technique for bridge maintenance

Source: Infravation website; project websites

The timeline below (Fig.2) indicates that about a year and a half were required after the official publication of the Infravation 2014 Call in order to launch the research projects selected through the two-step evaluation procedure.

Figure 2. Timeline for launch of the Infravation call and associated projects



Source: Presentation "Proposal Preparation and Submission" for the Brokerage Event (March 2014), FIRM Issue of June 2015

ANNEX 2. OTHER EUROPEAN RESEARCH INITIATIVES AND NETWORKS RELATED TO INFRAVATION⁶³

Infravation is well-embedded in the landscape of road research and the Consortium builds on the knowledge and lessons learnt from previous and on-going trans-national cooperation initiatives in the field.

CEDR's Transnational Road Research Programme and ERA-NET ROAD

The Transnational Road Research Programme is the research mechanism developed by the Conference of European Directors of Roads (CEDR) from the previous FP6 and FP7 ERA-NET ROAD (ENR) projects. CEDR experts representing the National Road Authorities meet annually through their Technical Group on Research to decide research priorities for the coming year. These are delegated to the Transnational Programme Meeting (TPM). Based on these priorities, nominated experts develop a Description of Research Need. Using the method developed under the ENR project, road authorities commit budget to a real common pot for the launch and subsequent funding of a call. A single road authority volunteers to lead this call, which is then run according to their national procurement rules. CEDR has launched one such call following the previous four calls run during the ENR projects. The TPM is responsible for ensuring the coordination of dissemination results from the different projects undertaken. Infravation has direct access to the TPM to ensure that all appropriate synergies are exploited.

ERA-NET TRANSPORT and ERA-NET Plus Electromobility+

ERA-NET TRANSPORT (ENT) is a cooperation network of owners and managers of national research funding programmes, which started in 2004 under the FP6 ERA-NET scheme. Besides the implementation of small- and medium-sized transnational calls, ENT aims to complement and step up the level of cooperation among the participating national transport research programmes by means of an ERA-NET Plus call. ENT has supported the preparation of the "Electromobility+" transnational funding initiative, set up as a joint call of national and regional programmes representing 13 European countries under the FP7 ERA-NET Plus scheme. The Electromobility+ call has been successfully launched in December 2010 and is one of the biggest ERA-NET Plus initiatives from FP7. Infravation cooperates with both ENT and ERA-NET Plus Electromobility+, in order to build on their experiences in the preparation, implementation and monitoring of large-scale transnational calls, particularly related to the ERA-NET Plus scheme. Infravation considers the lessons learnt from the previous ERA-NET calls and, moreover, is going ahead with the level of cooperation as compared to Electromobility+ by applying a real common pot model for funding. In doing so, there is the possibility for mutual learning between Infravation, Electromobility+ and ENT. The close exchange of information and experience is ensured by the overlap in partners. In particular, the coordinators of ENT and Electromobility+ are also involved in Infravation and build the natural links to best practice knowledge.

FEHRL's Forever Open Road (FOR) programme

In 2010, FEHRL initiated the Forever Open Road (FOR) programme as the core of its Strategic European Road Research Programme V (SERRP V). The FOR programme works towards a next generation of advanced and affordable roads that can be adopted both for maintaining the existing network and building new roads. This will enable future road operators to adopt emerging innovations, whilst overcoming the increasing constraints on capacity, sustainability, reliability and integration. The overall aim is to facilitate the future mobility needs of 21st century society. The SERRP document itself was derived from an extensive and detailed evaluation of the objectives of the Transport White Paper 'Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system' and the associated documents and working papers. This specifically addressed all the relevant issues for infrastructure. In delivering the FOR programme, cooperation is linked to a number of 'sister' National Programmes with shared aims and goals. Infravation builds on the existing knowledge and means of cooperation developed between these related programmes as the respective countries are also involved in Infravation (Germany, Norway, Netherlands, USA and France).

⁶³ Infravation Description of Work

ANNEX 3. EVOLUTION OF THE ERA-NET TOOL UNDER FP6, FP7 AND H2020

Under FP6

The EU 6th Framework Programme (FP6) launched a research funding scheme called ERA-NET (European Research Area Networks) in order to support transnational coordination, networking and collaboration of national research agendas and programmes in different thematic areas of research. The ERA-NET scheme aims at giving a framework for capacity building through knowledge sharing and identification of good practices within a specific research community (e.g. via joint trainings and workshops) as well as strategic alignment through the joint elaboration of research agendas (e.g. via meetings with national representatives) and operational alignment, especially through the design of joint calls.

Under FP7

However, the FP6 ERA-NET scheme was only focused on supporting coordination and networking activities and did not allow for direct EC co-funding of joint research activities. Therefore, an additional module was created under the 7th Framework Programme (FP7): this new tool, the ERA-NET Plus, was implemented in parallel of the first ERA-NET scheme and allowed the European Commission to co-fund joint transnational calls for research projects on specific subjects. This allowed for a significant increase of the average budget per transnational call launched under an ERA-NET (from 8 M€ with an ERA-NET to 19 M€ with an ERA-NET Plus).

Under Horizon 2020

For more overall consistency and simplification, both tools (ERA-NET and ERA-NET Plus) were merged under Horizon 2020 into one single funding scheme called ERA-NET Cofund: this latter mainly consists in the co-funding of a joint transnational call by the EC on a specific large-scale research topic of high value at the European level and can also support networking activities around the joint call.

Source: The ERA-NET scheme from FP6 to Horizon 2020 (J. Niehoff, 2014)



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.4- The Network for Humanities in the European Research Area (HERA)

Due date of deliverable: April 2016

Actual submission date: September 2016

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that supports greater alignment of research activities across countries, namely a **transnational network of 25 research funding organisations called “Humanities in the European Research Area” (HERA)**. This 15 year old network has provided an effective framework for funding and coordinating new research in the field of humanities thanks to the ERA-NET scheme (European Research Area Networks), which is co-funded by the EC and enables to launch transnational calls for project proposals. While focussing on the specific experience of HERA, the case study also provides lessons for other public-to-public research partnerships wishing to develop a similar instrument to promote **transnational research cooperation and coordination amongst European research funding organisations**, and alignment more generally. The case study does however not aim to provide an in-depth assessment of HERA nor of the ERA-NET instrument.

The study highlights HERA’s many benefits. The establishment of a first HERA ERA-NET allowed for **networking, trust-building and mutual learning** among research funding organisations, which is a precondition for coordinating research activities across borders and for boosting alignment at strategic and operational levels. In addition, HERA partners have successfully put in place a **central funding and call monitoring system** (i.e. Handling Agency), which has brought about efficiency gains and operational alignment. HERA’s “fair share” funding model has encouraged partners to engage significant financial contributions and allowed to fund an optimal number of joint research projects (by pooling EC co-funding into a real common pot for gap-filling only). Furthermore, the participation of European researchers in HERA joint research projects has **enhanced their research capacities** and provided opportunities for transnational collaboration. HERA partners and a large number of HERA research projects participants have prioritised **knowledge exchange and outreach** activities, especially vis-à-vis non-academic stakeholders in the context of HERA’s Knowledge Exchange Strategy. Lastly, the HERA network has successfully **promoted humanities within the European Research Area** and demonstrated its **sustainability** over time, by facilitating long-lasting collaborations amongst researchers and research funding organisations.

Yet, the HERA network has also been confronted with: (i) a need to adapt the governance structure of the network to the evolving membership; (ii) weak inter-operability between national eligibility criteria and low awareness of the network’s management rules, leading to confusion and difficulties regarding project implementation; (iii) time-consuming administration and reporting requirements; and (iv) the difficulty to assess the longer term impact on stakeholders and society at large.

The case study builds on the ERA-LEARN 2020 Task 4.1 (“Definition and Typology of Alignment”), and relies on a review of existing literature and targeted interviews with the Programme Coordinator of HERA. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 “Assessment of Current Approaches to Alignment”. The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to Alice Dijkstra (HERA Coordinator, Netherlands Organisation for Scientific Research) for her valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific alignment modality, namely the transnational network of research funding organisations “Humanities in the European Research Area” (HERA), which has been established thanks to the ERA-NET scheme (European Research Area Networks), that is co-funded by the EC and facilitates the launch of joint calls for project proposals (see Annex 3). The study assesses in what context such a tool is best used for promoting greater alignment of national research programmes and activities. While focussing on the specific experience of HERA, it also provides **lessons for other JPIs and public-to-public research networks** wishing to develop a similar instrument to promote transnational research cooperation and coordination amongst European research funding organisations, and alignment more generally.

The set-up of a **network of research funding organisations** mainly aims to coordinate national research funding strategies, pool national funding resources and synchronise calls for project proposals that address common research priorities, which allow researchers from different participating countries to jointly apply for funding. This approach particularly fosters alignment at financial and operational levels. Moreover, strategic alignment can be enhanced when the research network focuses on a broad multidisciplinary research topic such as the humanities.

2. Key features of HERA

2.1 Overview

HERA – standing for “Humanities in the European Research Area” – was established in 2004 as a Member-State initiative from Denmark, Ireland and the Netherlands. It is a transnational **network of 25 national research funding organisations**, committed to developing funding opportunities for humanities research in Europe.⁶⁴ It was initially launched as an ERA-NET under FP6, allowing to strengthen the network through **foresight and mutual learning activities** amongst members. Since then, HERA has supported **transnational coordination of research activities** through the launch of three joint calls⁶⁵ in 2009, 2012 and 2015 via the ERA-NET scheme.

The humanities have been recognised as crucial to the identification and analysis of socio-economic and cultural changes in Europe. HERA was able to set up a successful instrument to foster a **transnational research approach that enables the application of comparative views** and a mutual understanding and learning process amongst European researchers. Thanks to the identification of joint research priorities by national funders, HERA has greatly contributed to **implementing new cross-border research activities that address European research gaps, both in thematic and transdisciplinary focus**.

2.2 Mission and activities

HERA’s main objective is to ensure that the ERA can fully benefit from key contributions from humanities research by stimulating strategic reflection for this research area and promoting its role in European research programming. HERA focuses on several activities:⁶⁶

- 1) Coordination of national research policies, strategies and programmes in the field of humanities;
- 2) Launch of joint calls (named HERA Joint Research Programmes as indicated in the footnote n°2) and implementation of selected transnational and multidisciplinary research projects;
- 3) Definition of best practices for the promotion and evaluation of the impact of humanities research;
- 4) Promotion of the humanities at the level of the European Research Area;
- 5) Set up of a single HERA funding management body for each HERA joint call (i.e. HERA Joint Research Programmes), which acts as a centralised funding and management system;
- 6) Assistance to humanities researchers to succeed in HERA joint calls (e.g. through match-making events).

⁶⁴ Currently, 24 countries participate in the HERA network: Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and UK.

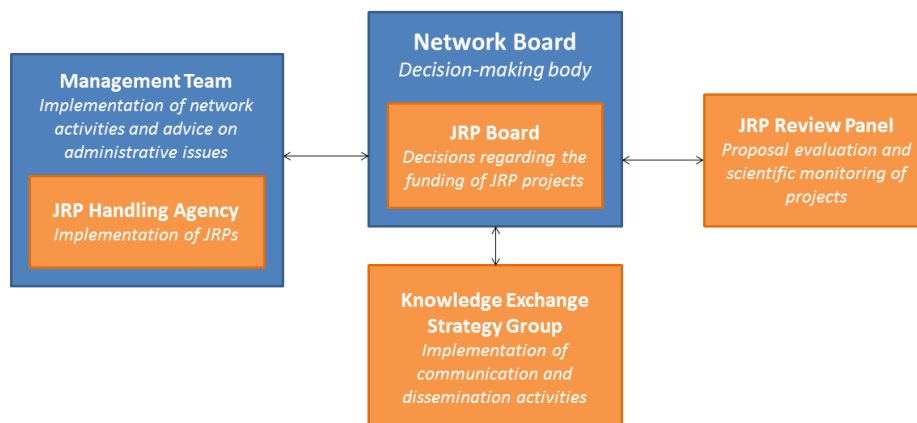
⁶⁵ HERA has named its joint calls Joint Research Programmes (JRPs). So far, three joint calls have been launched: JRP1 in 2009 and JRP2 in 2012 as ERA-NETs Plus, and JRP3 in 2015 as an ERA-NET Cofund (see timeline in Section 2.4).

⁶⁶ <http://heranet.info/hera-network-funders-humanities-the-european-research-area>

2.3 Governance structure

HERA's governance model (see Fig. 1) has evolved since its first design thanks to the application of lessons learnt over the years. Its current structure reflects the will to integrate the implementation of HERA joint calls (HERA JRPs; related governing structures in orange) to the overall governance of the network (in blue). The highest decision-making body of HERA is the Network Board which brings together all HERA partners. The funding organisations involved in HERA joint calls (HERA JRPs) have their own decision-making body (HERA JRP Board). For each joint call, participating HERA members jointly contract a Handling Agency (i.e. one of the HERA partners). The latter is in charge of the management of joint calls. In order to ensure the selection of best proposals and scientifically monitor the funded projects, the JRP Board appoints leading scholars to be part of the Review Panel.

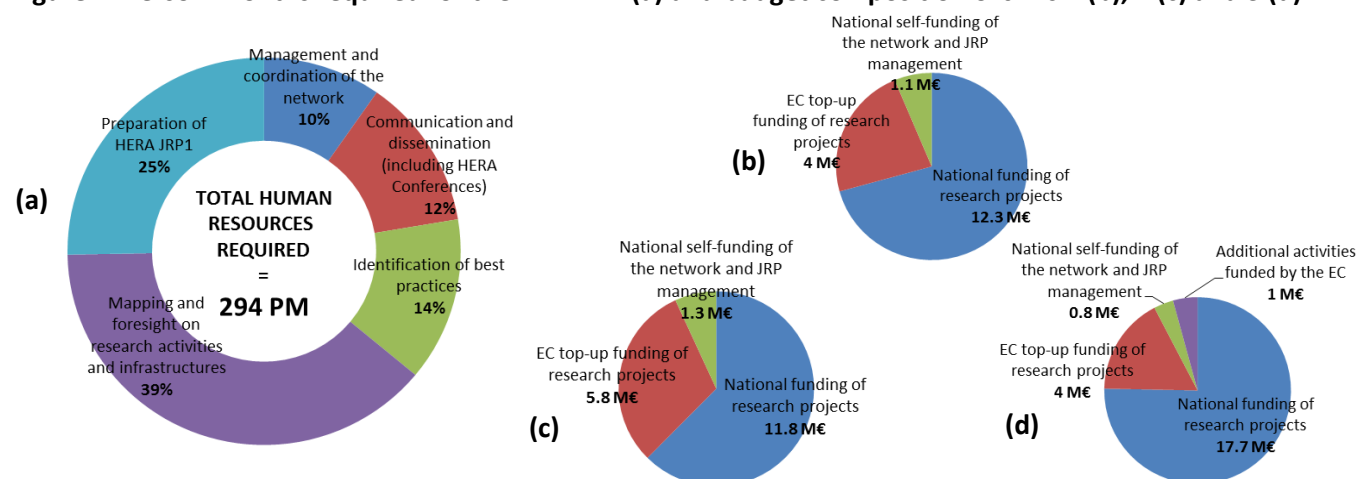
Figure 1. Governance structure of HERA



Source: HERA JRP UP Description of Work (JRP3; ERA-NET Cofund)

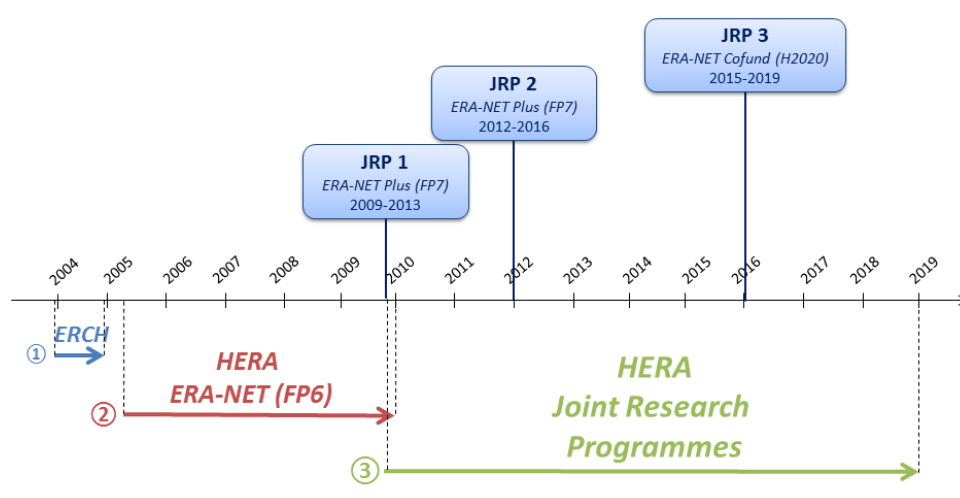
2.4 Approximate resources and time needed for implementation

The first HERA ERA-NET under FP6 had a total budget of 2.8 M€ over five years provided by the EC. Required human resources per type of activity are presented in Fig. 2.a). Regarding the funding model of joint calls (HERA JRPs; see Fig.2b), c) and d) respectively for JRP1, 2 and 3), the appointed Handling Agency acts as a **centralised funding and contracting body** for the calls. JRP1 applied a real common pot approach while JRP2 and 3 rely on a virtual common pot for national contributions and a real common pot for the EC top-up funding (i.e. only used for gap-filling). In all three cases, a model has been used in order to determine the “**fair share**” each country should contribute according to the national budgetary situation before being able to tap into the gap filling pot (see Section 4.2). Under FP7 (JRP1 and 2), the coordination of the network and the implementation of joint calls were entirely funded by participating countries. Under H2020 (JRP3), these costs have also been partially covered by HERA members, in addition to the funding of Additional Activities by the EC through the ERA-NET Cofund scheme.

Figure 2. Person-Months required for the ERA-NET (a) and budget composition of JRPs 1 (b), 2 (c) and 3 (d)

Source: Interview and HERA FP6 ERA-NET Final Activity Report

The timeline below (Fig. 3) gives an overview of the evolution of the network HERA and its activities. A first initiative, the European Network of Research Councils in the Humanities (ERCH), was established in 2002 by the Danish, Dutch and Irish Research Councils. It was followed by the implementation of the ERA-NET HERA in 2004, which was joined by the European Science Foundation (ESF)⁶⁷. The **FP6 ERA-NET** period was the key preparatory phase for developing and strengthening the network, and for promoting the alignment of national research strategies. Three joint calls have since been implemented (JRP1 and JRP2: ERA-NETs Plus; JRP3: ERA-NET Cofund).

Figure 3. Timeline for implementation

Source: HERA FP6 ERA-NET and ERA-NET Cofund (JRP3) Descriptions of Work

3. Principal outputs to date

The key achievements of HERA up to now have been supported by the strengthening and expansion of its network. The HERA membership has increased from 14 to 25 partners since 2004. HERA has greatly contributed to advancing European knowledge in the humanities, especially through its first two joint calls, of which the projects are now completed on the following three research topics: “Cultural Dynamics: Inheritance and Identity” (JRP 1 – 2009), “Humanities as a Source of Creativity and Innovation” (JRP 1 – 2009) and “Cultural Encounters” (JRP 2 – 2012). The third HERA joint call (JRP3) has launched projects addressing the issue of “Uses of the Past” (see Annex 1 for more information on JRP topics). So far, HERA has allowed to finance and support:

⁶⁷ Established in 1974, the ESF provides a platform for research councils in the Humanities and develops related networking instruments.

- During the first FP6 ERA-NET (i.e. initial networking phase): five main deliverables on best practices regarding application procedures, peer review, impact assessment, evaluation and programme management; and six main deliverables resulting from joint mapping and foresight processes regarding national research activities and joint research priorities in the humanities;
- The establishment of an online reference index for scientific journals in the humanities and social sciences (European Reference Index for the Humanities);
- Three matchmaking events, each one of them taking place during the launch of a HERA joint call⁶⁸ in order to facilitate networking and exchange of ideas amongst researchers regarding potential project proposals;
- The pooling of national resources amounting to (i) 41.8 M€ in order to fund HERA's joint research projects and (ii) 3.2 M€ in order to fund the operation of the network and of the launch of joint calls, and knowledge exchange activities;
- The completion of 37 joint research projects under HERA's first and second call (JRP1 and 2) and the launch of 18 new projects involving 21 countries under its third call (JRP3);
- The involvement of 173 associated partners and of nearly 300 PhD students and postdoctoral researchers.

4. Overall strengths of this tool, including key achievements

HERA has greatly contributed to transnational cooperation and mutual understanding as well as financial and operational alignment in the field of humanities. The use of the ERA-NET and ERA-NET Plus instruments has allowed to build a strong transnational network and to provide an effective framework for funding joint research activities. The ERA-NET Cofund scheme brings both of these aspects together (i.e. networking and coordination).

4.1 *Networking and trust-building among research funding organisations as a precondition for alignment*

As mentioned above, the HERA network was established through a first ERA-NET in 2004, which was key to build trust and a common desire to coordinate research activities across borders. It focused on the following aspects:

- 1) **Establishment of the network's governance model** (see Section 2.3) in order to clearly define rules regarding decision-making processes and involvement of partners. This governance model has evolved over time in order to gain effectiveness in implementing joint calls and strengthening the network.
- 2) **Networking activities for trust building**: the establishment of the network has required mutual understanding of each partner's expectations and common benefits from transnational cooperation. This was achieved by delegating responsibilities to various partners for stronger involvement and community building, holding meetings of manageable size in various locations using premises of most of the partners in order to increase their commitment towards the network, etc.
- 3) **Outreach towards new partners**: in particular, the ESF joining the ERA-NET allowed to build on the experience of its Standing Committee for the Humanities, enhancing HERA's outreach to policy-makers.
- 4) Joint activities for **mutual learning and capacity building of partners** such as the sharing of best practices (see Section 3) and the identification of legal and administrative barriers to a joint call. Partners then applied best practices when launching HERA's first call (JRP1). This learning and capacity building process has continued with the implementation of subsequent joint calls (JRP2 and 3; see Sections 4.2 and 4.3).
- 5) **Joint activities for strategic alignment**, including benchmarking of current research activities, mapping of research priorities, thematic scoping, mapping of and strategy for humanities infrastructure. These activities responded to the need for new humanities research, in addition to networking and coordination activities. They were carried out through a bottom-up approach thanks to a broad consultation process among a large number of scholars and led to the elaboration of several deliverables (see Section 3).

⁶⁸ Matchmaking Events took place in Paris in 2008 (JRP 1), in Berlin in 2012 (JRP 2) and in Tallinn in 2015 (JRP 3).

4.2 Gradual financial alignment thanks to the “fair share” funding mechanism

For each HERA joint call (JRP), the appointed **Handling Agency** was in charge of collecting national funding contributions and distributing them to project coordinators.⁶⁹ This **centralised funding management** saves time at national level and is appreciated by partners, especially by countries that face political instabilities and hence that would be more affected by variations in national research budgets if this delegated model was not applied. Also, transferring project budgets to project coordinators enables to empower the latter in their leadership position.

As mentioned in Section 2.4, **HERA’s call funding model has evolved over time in order to take account of specific national financial situations**. While applying national eligibility criteria, the first joint call (JRP1) adopted a real common pot based on the Scandinavian experience through which Nordic countries share their financial resources to fund joint research activities. A **“fair share” model** was developed to calculate reasonable national contributions according to national research budgets. For HERA’s second call (JRP2), the real common pot did not suit new HERA partners, which is why a virtual common pot was applied that still used the fair share model. In order to fund as many excellent projects as possible, some partners voluntarily increased their contribution. For the third call (JRP3), members also applied a virtual common pot. However, this joint call could not rely on the same fair share model as the one used in JRP1 and 2. Indeed, specific EUROSTAT data on national research budgets had been used for previous calls but were no longer available for JRP3. Hence, the model that was used for this last call relied on data regarding GDP and population, which is of less direct relevance than national research budgets to determine a “fair share”. In addition to the initial commitment calculated by the model, most partners managed to secure an additional 25% reserve of funding at national level in order to easily follow the ranked list of projects.

The fair share model is of high importance in the eyes of HERA partners as it strongly encourages Member-States to engage themselves significantly in transnational research initiatives which benefit from an EC top-up incentive. This model has been contributing to trust-building among HERA partners, especially as it is mostly medium-sized countries that run the network and implemented joint calls. As explained above, the fair share model has faced some limitations such as the lack of appropriate EUROSTAT data. Therefore, HERA is in the process of improving this model to calculate fair contributions per country that would better take into account national funding constraints. The real common pot used for the EC top-up (see Section 2.4) is considered by partners as essential to fund as many projects as possible following the ranking list. Furthermore, the HERA Network is now also investigating the possibility to fund additional joint activities in “variable geometry”.

4.3 Strong operational alignment through centralised programme coordination and management procedures and delegation of responsibility

The Handling Agency provides a centralised system for both funding and management procedures. The workload is distributed over time and follows the main two phases of the implementation of joint calls: 1) management of the call, including monitoring of the joint selection of projects by the International Review Panel in a two-step procedure (Outline and Full Proposals); and 2) management of the programme and projects.⁷⁰ Although some partners may have been reluctant at first in delegating their responsibilities, the implementation of centralised procedures has proven to be **time-efficient** and greatly contributes to **capacity building and operational alignment amongst HERA partners and possibly the EC**.

4.4 Effective capacity building of participating European researchers

Research projects funded by partner countries usually involve researchers of at least three or four countries. Bearing in mind that until recently the national focus has been more pronounced in the field of humanities than in other research areas, the transnational approach adopted by HERA to conduct research has had several beneficial

⁶⁹ This is referred to as the “delegation coordination” model in the Final Report on Investments in JOint and Open REsearch Programmes and analysis of their economic impact (JOREP; 2013).

⁷⁰ For HERA’s first call (JRP1), a single Handling Agency (European Science Foundation) was in charge for both phases while for the second and third call (JRP2 and 3), two Handling Agencies (European Science Foundation and Irish Research Council; Netherlands Organisation for Scientific Research and Irish Research Council) have been each responsible for one of the phases. In any case, only one Handling Agency at a time is operating as the first phase does not overlap with the second one.

effects on participating researchers. The latter indicate that their involvement in HERA projects under the first call has **enhanced their research competences** through their interaction with researchers from other countries. This has enabled an active exchange of ideas and the comparison and integration of different national research traditions and methods, leading to the overall **improvement of the scientific quality** of their work.⁷¹

Moreover, researchers have benefitted from an **increasing number of opportunities for networking and collaboration** amongst the European and international scientific communities in the field of humanities. In addition to the networking provided through HERA research projects, the HERA network has set up online partner search tools and organised matchmaking events during the launch of each joint call to allow researchers from different countries to meet and discuss ideas for potential joint projects. These matchmaking events have also provided capacity building for researchers regarding proposal writing and consortium building.

4.5 Strong emphasis on knowledge exchange and outreach activities

A key criterion for the selection of HERA project proposals includes knowledge exchange activities, which have been deemed as essential for the projects' impact (e.g. conferences, policy forums, workshops, trainings, documentaries, podcasts, etc.). Thus, **HERA joint project consortia have been strongly encouraged to collaborate with non-academic partners**. HERA partners and participants have found this approach much more effective, instead of only relying on the implementation of an overall HERA outreach strategy. The involvement of non-academic stakeholders as co-researchers in certain projects has improved the latter's scientific quality by bringing in a different type of expertise and has enhanced significant impacts at various levels (e.g. impact on research and researchers, pedagogical impact, impact on professionals, on policy, commercial impact on related industries and businesses).⁷² For example, the participation of museums is of particular interest as they provide extra resources, infrastructures and/or expertise for dissemination of research results to a wider audience.

Furthermore, a specific body is dedicated to the development of an **overall Knowledge Exchange Strategy for the network as a whole** (see Section 2.3), beyond the knowledge transfer activities included in each HERA project. This strategy sets out the activities to be implemented for broader dissemination of HERA results (e.g. HERA JRP Launch and Final Conferences, workshops with policy-makers, festivals for broader outreach). For instance, after HERA's first joint call, an additional call for Knowledge Transfer activities was launched in order for HERA projects to jointly disseminate their results. In addition, target groups of stakeholders and appropriate means of communication have been defined for effective knowledge transfer.⁷³

4.6 Strengthening of the European Research Area and increased visibility of humanities research in Europe

HERA has greatly contributed to strengthening the ERA over time. During the first ERA-NET, Annual HERA Conferences emphasised the **contribution of humanities to the ERA and to European cooperation** more generally. The ERA-NET's joint mapping and foresight activities demonstrated the collective desire to strengthen the ERA as a whole and an "influence list" was defined in order to enhance the network's visibility and impact on the ERA.⁷⁴ HERA joint calls aim to **provide EU policy advice** and to **enhance synergies with related European and international programmes**. In particular, this has been fostered thanks to HERA partners' affiliation with initiatives such as the Joint Programming Initiative on Cultural Heritage, the ERA-NETs Norface and Net4Society, and the Trans-Atlantic Platform.⁷⁵ HERA's increased visibility at European and international levels has been demonstrated in several ways. For example, approximately 600 Outline Proposals were submitted for HERA's second and third joint call (i.e. double compared to the first call). In addition, some associated research centres are located in China, India and the USA, hence increasing HERA's international visibility.

⁷¹ This is explained in further detail in the Evaluation Report of HERA JRP1.

⁷² An impact assessment has for instance been carried out for the JRP1 project "*Creativity and Craft Production in Middle and Late Bronze Age Europe*" 20 months after the end of the project in order to assess its post-project impact.

⁷³ Targeted stakeholder groups are: Humanities researchers; Researchers in other disciplines; Policy-makers; Museums, galleries, libraries; Businesses; Creative practitioners; Media organisations; Community/Grassroots groups; NGOs, charities, etc.; Educational sector (non-university); General public. Specific media used are: website, events, workshops, press, social media, blog, newsletters and leaflets.

⁷⁴ This list is divided in three sections: (i) List of individuals who are in a position to influence research policy in national contexts; (ii) List of individuals in national media; and (iii) List of individuals who are members of supranational agencies.

⁷⁵ HERA JRP UP Description of Work (JRP3; ERA-NET Cofund)

4.7 High sustainability of the network

Long-lasting collaborations between researchers have been developed beyond the life-time of HERA projects through the significant expansion of researchers' professional networks thanks to HERA projects (see Section 4.4). They provide a sustainable networking background for humanities research and the ERA more broadly. In addition, although HERA joint calls each require independent EC grant applications⁷⁶, the HERA network has succeeded in developing **sustainable partnerships among participating research funding organisations**. This has been demonstrated by its 15-years existence and by the significant expansion of its membership over time.

5. Overall limitations with this tool, including difficulties encountered during implementation

Limitations have mainly been identified for HERA's first joint call (JRP1) as it is the only one which has been completed and evaluated so far.

5.1 Need to adapt the governance structure of the network to the evolving membership

The HERA network has now 25 partners compared to only 13 partners at the beginning of the initiative. This significant expansion has led to much larger meetings. Indeed, two national representatives per country are around the table (i.e. one from the Network Board and one from the Management Team), and hence about 50 people in total. These conditions do not allow for efficient discussion and decision-making and for bringing everyone to a consensus. Hence, the network's governance structure is in the process of being restructured, for instance with the elaboration of Working Groups which can individually work on specific themes and issues.

5.2 Weak inter-operability between national eligibility criteria and low awareness of the network's management rules

Although HERA members had adopted a real common pot approach for the first joint call (JRP1), national eligibility criteria were applied. Hence, some JRP1 project leaders experienced difficulties in dealing with differing grant rules amongst national funding organisations. Similarly, some research organisations participating in the first and third call were not fully aware of HERA joint calls' management rules and conditions, which also led to confusion and difficulties regarding project implementation. In particular, appointing a central funding body that collects all national contributions into a centralised virtual common pot can be challenging. This requires the transfer of money across borders, which is not easily feasible for certain countries. For HERA's third call (JRP3), Spain and Italy had to carry out additional administrative work to overcome legal issues while the Czech Republic was able to change its national laws. However, even when using a virtual common pot, the benefits of having a centralised funding pot exceed the difficulties linked to transnational flow of money (see Section 4.2).

Such difficulties could be avoided by strengthening knowledge exchange regarding established HERA procedures, especially with new partners. Another option would be to harmonise certain national rules within the HERA network, which is unfortunately impossible for some countries. Also, familiarising oneself with the network's rules and related ones at the national and institutional levels requires a lot of time in order to become aware of potential issues and discuss them. Thus, pursuing mutual learning activities is crucial in order to develop a common understanding and, when possible, an increasing operational alignment of funding, application and management procedures. HERA partners have for instance started to set up a HERA Handbook.

5.3 Time-consuming administration and reporting requirements

JRP1 project leaders evaluated reporting requirements as very demanding in terms of content and frequency, especially considering the available human resources. This left less time for them to address research issues. However, this close project monitoring supported an increasing interest of funding providers in project outcomes.

5.4 Difficulty to assess the longer term impact on stakeholders and society at large

As mentioned in Section 4.5, the involvement of non-academic stakeholders was considered as a valuable experience for the majority of HERA projects under the first call (JRP1). In cases where project participants had not put priority on collaboration with stakeholders, potential benefits were diminished. In addition, as the JRP1 evaluation was conducted at a late stage, many stakeholders that had been involved in projects were already

⁷⁶ The ERA-NET Plus/Cofund funding instrument does not provide funding for several successive calls in the perspective of a multi-annual research programme in a thematic area.

engaged in other activities and could not provide a feedback on their experience in HERA projects. Hence, the evaluation may not be sufficiently representative of the real involvement of stakeholders and related benefits and impacts. Stakeholders should be approached earlier after the end of projects for effective evaluation.

Concerning the implemented activities related to the overall HERA Knowledge Transfer Strategy, several JRP1 project participants were sceptical about their added value. The objective and target audience of a knowledge exchange event should be clearly defined (e.g. raise awareness about humanities research among the general public, or discuss projects with relevant and more experienced stakeholders in order to enhance the scientific quality and impact of projects). Lessons learned from HERA's first call have been used in developing revised Knowledge Exchange strategies for its following calls. Marking the close of JRP2 projects as well as the launch of JRP3 projects, the HERA conference that took place in September 2016 (#HumanitiesMatter) featured sessions to discuss knowledge exchange strategies, a panel on how to deal with media, and several screenings, concerts, etc. This allowed to exchange best practices for knowledge transfer and collaboration with non-academic stakeholders amongst experienced researchers and those who are new to HERA.

Lastly, it should be kept in mind that a project's impact is in any case difficult to measure as it mostly reveals itself after a longer time frame and is influenced by various factors.

6. Conclusions: Suitability and key factors of success

The set-up of a network of national research funding organisations is most suited to **coordinate national research funding strategies and pool national resources** at the European level in order to jointly fund new high quality research activities of high priority to all partners. If the network is established in a broad research area such as the humanities, it is also well-suited to carry out foresight activities and jointly define common research priorities, hence **influencing and aligning research strategies at national levels**. Above all, such a network is an appropriate framework for the **identification of best practices and mutual learning exercises** amongst network partners.

The evolution in time of the EC's instrument that supports this type of network, i.e. the ERA-NET scheme, demonstrates the desire to implement transnational networking and joint research activities in parallel in order to address European research issues, and the need to effectively combine both aspects as they go hand in hand. Indeed, a research network alone may not sufficiently enhance the transnational coordination and alignment of research activities. At the same time, only focusing on the operational dimension of implementing joint research does not allow the development of long-term objectives and vision for strategic alignment in the considered research area.

Key factors of success:

1) At strategic level:

- **Establish a network that facilitates trust building** and mutual learning activities amongst partners: this is especially important in research areas with few transnational networking and research activities.
- **Implement an efficient governance structure** that facilitates a long-term strategic reflection on common research priorities that can be addressed jointly via transnational research activities: in particular, the established governance model should effectively support a potential expansion of the network if desired. Also, the governance model should support a strong knowledge exchange between policy makers, funding organisation managers and scientific representatives in the network.

2) At financial level:

- **Develop a funding mechanism that is adapted both to networking/mutual learning and joint research activities:** this funding mechanism can evolve over time and should take into account available funding resources at national levels, i.e. take into account the type of available funding (in-kind and/or in-cash funding) and the amount of available funding.
- In particular, **agree on common funding rules to finance new research projects and clearly discuss them amongst involved partners and participants:** for instance in the case of a delegated coordination model with a single funding and contracting body, it is crucial to make sure that all partners are able to transfer their committed funding into the centralised virtual or real common pot of the research programme.
- **Enhance the financial commitment of participating countries:** this can for instance be achieved by adopting a "fair share" model, which estimates "reasonable" national contributions according to national budgets and constraints, and empowers countries regarding their financial commitments. It contributes to trust building amongst countries and hence to long-term sustainability of the network.

3) At operational level:

- **Develop common procedures for centralised programme management** (e.g. project selection, monitoring, evaluation, impact assessment): a centralised programme management structure is required in order to facilitate the implementation of common procedures that are defined by network members.
- **Ensure stakeholder engagement:** when relevant, **involve non-academic stakeholders in project and knowledge exchange activities:** the interaction of non-academic partners within certain research projects can be valuable for increasing the quality, relevance and impact of the conducted research. Similarly, knowledge exchange activities should be designed bearing in mind their defined objective and target audience.

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Interview

Alice Dijkstra: Coordinator of HERA JRP1, 2 & 3 – Netherlands Organisation for Scientific Research (NWO)

ANNEX 1. RESEARCH TOPICS ADDRESSED BY HERA JOINT RESEARCH PROGRAMMES

HERA Joint Research Programme 1: “Cultural Dynamics: Inheritance and Identity” and “Humanities as a Source of Creativity and Innovation”⁷⁷

The 1st HERA JRP focused on two humanities research themes. The first one addressed the issue of **“Cultural Dynamics: Inheritance and Identity”**. It has aimed to look at culture as a process rather than as a product, as a praxis rather than a pragma. These cultural processes and practices were to be addressed as complex dynamic systems, the focus being specifically on the way in which cultural exchanges and dynamics cross between social strata, between countries, and between media. Culture was to be studied, not as the output of a given society, community, or generation, but as a form of traffic between societies, communities and generations.

The second theme addressed by the HERA JRP 1 call focused on **“Humanities as a Source of Creativity and Innovation”**. It has aimed to address creativity in all its aspects in the expectation that new research, whether it be disciplinary or interdisciplinary, into the processes and conditions of human creativity adds new understandings of the value systems of the humanities and the practices and conditions of the creative, performing and visual arts, and a much better understanding of how these values and processes might contribute to cultural, social and economic innovation. In particular, the programme has aimed to draw value from the collaboration between researchers in a range of European countries with different experiences of the creative industries, different models of the creative community or the „creative city“, and different histories of engagement in the agenda which links creativity and innovation.

HERA Joint Research Programme 2: “Cultural Encounters”⁷⁸

The 2nd HERA JRP focused on the research theme **“Cultural Encounters”**. It has aimed to address the general historical and theoretical issues related to the analysis of cultural encounters: to understand cultural encounters is to understand the history and meaning of Europe and the world, from the earliest periods of human settlement to the present day. HERA JRP 2 has also supported the investigation of more specific and exemplary aspects of cultural encounters. The programme has aimed to investigate the phenomenon of cultural encounters in spatial terms (i.e., cultural encounters within geographical frames) as well as temporal terms (i.e., in contemporary time, as well as in long-term historical perspectives).

HERA Joint Research Programme 3: “Uses of the Past”⁷⁹

The latest HERA JRP aims to address how and by whom European, non-European or global pasts are actively and instrumentally used, and to what ends (including their relation to essential issues such as solidarity, trust and imagined futures), always taking into account an explicit connection to past or present debates or transformations in Europe. It seeks to examine which historically-informed orientations and actions in society are promoted, mobilised and legitimised, and which mechanisms and motives lie behind the work of historical understanding – in arts, film, literature, drama, media, social media, landscapes, public spaces, languages, philosophy and religions as well as in research, education, politics, economics and journalism. This knowledge will enable to see more clearly the complex ways in which European cultural diversity has been formed, and the dynamics by which it may be shaped and directed in the future. Ultimately such awareness of the past and its profound effects upon present decision-making and cultural practice can assist in building effective policies to encourage societal resilience, creative thinking, responsible citizenship and intelligent responsiveness to new challenges.

⁷⁷ HERA Joint Research Programme 1 – Call for Outline Proposals

⁷⁸ HERA Joint Research Programme 2 – Call for Proposals

⁷⁹ HERA Joint Research Programme 3 – Guidelines for Applicants: Full Proposals

ANNEX 2. WORK PLAN OF HERA'S THIRD JOINT RESEARCH PROGRAMME (ERA-NET COFUND)⁸⁰

The HERA JRP UP (JRP3) activities consist of two parts. Firstly, work package 1 – 6 are activities related to the new co-funded HERA JRP joint call (see list A below). Secondly, work package 7 – 8 refer to the additional activities planned to a) to stimulate and support capacity-building for humanities scholars to participate in trans-national calls, to engage in multidisciplinary problem solving, to collaborate with different types of stakeholders and to stimulate them to engage with all Horizon 2020 challenges and b) strengthen and enlarge the network and to prepare for new joint activities (see list B below). Both additional work packages ensure coordination of activities with related European programmes such as e.g. the Trans-Atlantic and the EU-Indian Platform, NORFACE and Net4Society. Furthermore, links with activities such as the “Social Platform on Reflective Societies”, the “Communication and Dissemination Platform”, the “Social Innovation Community” and the “Platform for ICT for Learning and Inclusion” are realised as well.

A. Activities related to the co-funded call and the consortium management

- WP1: Consortium Management
- WP2: Preparation and publication of the Joint Call
- WP3: Evaluation of Proposals (steps I and II)
- WP4: Negotiations and start of Trans-national Research Projects
- WP5: Monitoring and financial administration of Trans-national of Research Projects
- WP6: Knowledge Exchange and Communication

B. Additional activities

- WP7: Capacity-building and Embedding
- WP8: Strengthening the network and exploring and preparing for new joint actions

ANNEX 3. EVOLUTION OF THE ERA-NET INSTRUMENT UNDER FP6, FP7 AND H2020

Under FP6

The EU 6th Framework Programme (FP6) launched a research funding scheme called ERA-NET (European Research Area Networks) in order to support transnational coordination, networking and collaboration of national research agendas and programmes in different thematic areas of research. The ERA-NET scheme aims at giving a framework for capacity building through knowledge sharing and identification of good practices within a specific research community (e.g. via joint trainings and workshops) as well as strategic alignment through the joint elaboration of research agendas (e.g. via meetings with national representatives) and operational alignment, especially through the design of joint calls.

Under FP7

However, the FP6 ERA-NET scheme was only focused on supporting coordination and networking activities and did not allow for direct EC co-funding of joint research activities. Therefore, an additional module was created under the 7th Framework Programme (FP7): this new funding instrument, the ERA-NET Plus, was implemented in parallel of the first ERA-NET scheme and allowed the European Commission to co-fund joint transnational calls for research projects on specific subjects. This allowed for a significant increase of the average budget per transnational call launched under an ERA-NET (from 8 M€ with an ERA-NET to 19 M€ with an ERA-NET Plus).

Under Horizon 2020

For more overall consistency and simplification, both funding instruments (ERA-NET and ERA-NET Plus) were merged under Horizon 2020 into one single funding scheme called ERA-NET Cofund: this latter mainly consists in the co-funding of a joint transnational call by the EC on a specific large-scale research topic of high value at the European level and can also support networking activities around the joint call.

Source: The ERA-NET scheme from FP6 to Horizon 2020 (J. Niehoff, 2014)

⁸⁰ HERA ERA-NET Cofund Proposal



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.5- JPI Oceans' Shared Research Vessel

Due date of deliverable: April 2016

Actual submission date: September 2016

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that supports greater alignment of research activities, namely the **shared use of the German Research Vessel SONNE**, undertaken in the context of a transnational research project launched by the **Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans)**. While focusing on the specific experience of JPI Oceans, the case study also provides lessons for other public-to-public research partnerships wishing to develop a similar approach to facilitate the sharing of research infrastructure, in view of promoting cross-border alignment. The case study does however not aim to provide an in-depth assessment of JPI Oceans' approach.

The study highlights the many benefits of jointly using national research infrastructure. This **cost-effective** approach allows to reduce costs related to the implementation of a research project at national level as the latter are borne by all participating partner countries. As such, countries with less financial resources can benefit from expensive cutting-edge research facilities or equipment. In addition, researchers from different countries work as a team for a joint project in the same place and at the same time. This has contributed to **trust-building amongst researchers**, the **development of a common understanding** and the **integration of national research activities around a common scientific objective**. At an operational level, the shared use of research infrastructure has facilitated **standardised data collection**, **coordination of research methods** and **open access to research data**. Lastly, this has in turn allowed for **more effective collective European contributions to international policy-making**.

Yet, JPI Oceans' participating members have also been confronted with: (i) limited time to set up the terms for sharing the research vessel, as Germany had to quickly start planning next research cruises on its newly built research vessel, hence preventing the implementation of a competitive bidding system; and (ii) a challenging elaboration of a new funding mechanism for cross-border infrastructure sharing, and particularly for the *simultaneous* use of a research vessel by several research institutes under the same transnational research project.

The case study builds on the ERA-LEARN 2020 Task 4.1 ("Definition and Typology of Alignment"), and relies on a review of existing literature and targeted interviews with the member of JPI Oceans' Secretariat in charge of following the related joint research project and the Project Manager. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 "Assessment of Current Approaches to Alignment". The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to John Hanus (JPI Oceans Secretariat) and Norbert Blum (Project Manager, Jülich) for their valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that promotes alignment, namely the **shared use of the German Research Vessel SONNE**, undertaken within a transnational research project launched by the **Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans)**. The study assesses in what context such an approach is best used for promoting greater alignment of national research programmes and activities. While focusing on the specific experience of JPI Oceans, the case also provides **lessons for other JPIs and public-to-public research networks** wishing to develop a similar approach to facilitate the sharing of research infrastructure to promote cross-border alignment.

According to the Typology of Alignment (ERA-LEARN 2020 Task 4.1), the shared use of existing national research infrastructure is implemented thanks to an agreement among countries on the procedures, rules and fees for the common use of research infrastructure. This modality relies on alignment at operational and financial levels. It mainly concerns the implementation phase of the research programming cycle. In JPI Oceans' case, the development and implementation of the research project that has supported the joint use of a national research infrastructure has particularly involved research performing organisations and individual researchers.

2. Key features of JPI Oceans' infrastructure sharing approach

2.1 Overview

The three-year pilot action "Ecological Aspects of Deep-Sea Mining" was launched by JPI Oceans in January 2015. This transnational research project aims to assess the ecological impacts that could arise from commercial mining of deep-sea minerals called polymetallic nodules. The project brings together researchers and 25 different research performing organisations active in the field of deep-sea research across 11 European countries⁸¹. It was initiated by the German Federal Ministry of Education and Research, which offered to share the use of its newly built research vessel *RV SONNE* during 118 days to support this transnational research project. This research cruise took place around the international concession areas for deep sea mining in the Eastern Pacific, between March and October 2015. Each cruise leg lasted about a month to a month and a half. Shore-based analyses of the data collected onsite are being conducted in order to quantitatively estimate the potential impacts of polymetallic nodules deep-sea mining.

Several countries are considering undertaking deep-sea mining as an economic activity. As there is only very limited knowledge on its potential impacts, the United Nations (UN) seeks to establish a global governance framework for deep-sea resources. It wishes to define a legal framework which regulates deep-sea mining activities and has put the International Seabed Authority⁸² (ISA) in charge of elaborating common standards and governing rules. Hence, a common European input towards this global framework is needed. The joint action launched by JPI Oceans seeks to address this European challenge by providing scientific knowledge and policy advice on the ecological impact of deep-sea mining. As a ship is required to carry out this type of research, sharing an existing research vessel was most suited in this case in order for a European research team to jointly collect and analyse the required data.

The approach of sharing a research vessel is quite unique as it has been implemented for very few ships worldwide (e.g. through barter systems). Even then, the agreement of lending the ship is generally only bilateral since the latter is usually used by one research institute at a time, and not by a transnational team **bringing together research institutes from various countries simultaneously** as it is the case for JPI Oceans' pilot action. More broadly, the coordination and sharing of research infrastructures is being increasingly promoted at the European level in order to facilitate the access of scientists to most up-to-date infrastructures, enhance economies of scale and develop highly interoperable research processes.⁸³ The **European Strategy Forum on**

⁸¹ Belgium, France, Germany, Italy, the Netherlands, Norway, Poland, Portugal, Romania, Sweden and the United Kingdom.

⁸² The International Seabed Authority was established under the 1982 United Nations Convention on the Law of the Sea and is an autonomous international organization through which States Parties to the Convention organize and control activities on the seabed and ocean floor and in the subsoil beyond the limits of national jurisdiction and within the geographical boundaries defined in the Convention.

⁸³ In the field of marine research, this has for instance been enhanced through the European Network of Marine Research Institutes and Stations (MARS; <http://www.marsnetwork.org/>).

Research Infrastructures (ESFRI) supports competitive and open access to high quality Research Infrastructures across Europe (see Box 1).

Box 1. The European Strategy Forum on Research Infrastructures (ESFRI)

ESFRI seeks to facilitate multilateral initiatives leading to the better use and development of research infrastructures, at EU and international level. It identifies **Research Infrastructures (RIs) of pan-European interest** meeting the long-term needs of Europe's research communities across all scientific areas. As such, it provides to the Council of the European Union a coherent and strategic vision regarding European RIs through the publication of updated ESFRI Roadmaps.

ESFRI acts as an incubator for new RIs or for the upgrading of existing ones through their inclusion in its Roadmap as **ESFRI Projects**. It supports their implementation within a maximum of one decade, in order to reach sustainability for the long term operation, therefore assuring maximum return on investment in terms of science, knowledge, innovation, training, socio-economic benefits and competitiveness. ESFRI Projects are selected for their high degree of maturity and for their strategic importance within the European Research Infrastructure system. **ESFRI Landmarks** are successfully implemented ESFRI Projects that are featuring top science services or effectively advancing in their construction. ESFRI facilitates their continuous support for successful completion, operation and upgrade in line with the optimal management and maximum return on investment. ESFRI currently supports 21 ESFRI Projects and 29 ESFRI Landmarks.

In addition, ESFRI provides a mapping of Research Infrastructures open to European scientists at national, European and international levels through its **Landscape Analysis**. The latter hence gives an overall view of the European RI system and is key to the selection of new ESFRI projects as it allows to better understand the potential impact of proposed RIs.

Over the past decade, ESFRI has improved the efficiency and impact of the European RI system. Most national strategies are now coordinated with that of ESFRI and move towards a sustainable investment for overall competitiveness.

Source: ESFRI Roadmap 2016

2.2 Mission and activities

The overall aim of JPI Oceans' deep-sea mining research is to provide joint European scientific recommendations for the future regulation of deep-sea mining activities at the UN level. Researchers participating in JPI Oceans' pilot action and joint cruise seek to:

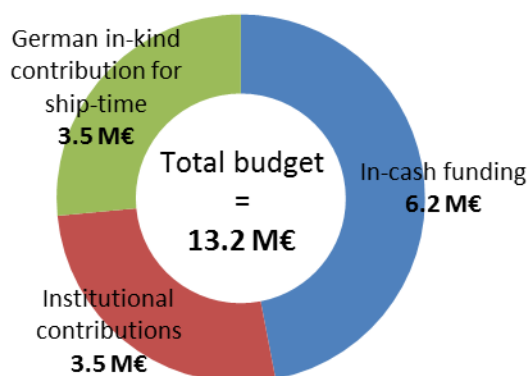
- Predict the ecological, biogeochemical and hydrodynamic consequences of a mining impact;
- Test a range of modern rapid assessment methods and monitoring techniques for defining the ecosystem status, especially before and after anthropogenic disturbances;
- Conduct a comparative baseline study across different deep-sea environments (e.g. trophic states and seamounts): this aims to strengthen baseline studies that must be undertaken by European holders of exploration licenses from the International Seabed Authority;
- Communicate the results to stakeholders, policymakers to initiate the revision of ISA regulations, where appropriate, and a discussion on how to minimize the ecological impacts of future deep-sea mining activities.⁸⁴

2.3 Approximate resources and time needed for implementation

JPI Oceans' pilot action **relies entirely on participating countries' funding**. Its total budget amounts to 13.2 M€, which includes about half of in-kind contributions and half of in-cash contributions (see Fig. 1). Using a deep-sea research vessel is very costly, which is why Germany's contribution for ship-time represents over 25% of the total costs. Institutional contributions are provided by participating research performing organisations. In-cash funding has served to cover the costs for hiring additional staff, travelling, renting equipment, etc.

⁸⁴ JPI Oceans Annual Report 2015; <http://www.jpi-oceans.eu/ecological-aspects-deep-sea-mining>

Figure 1. Total budget of JPI Oceans' pilot action



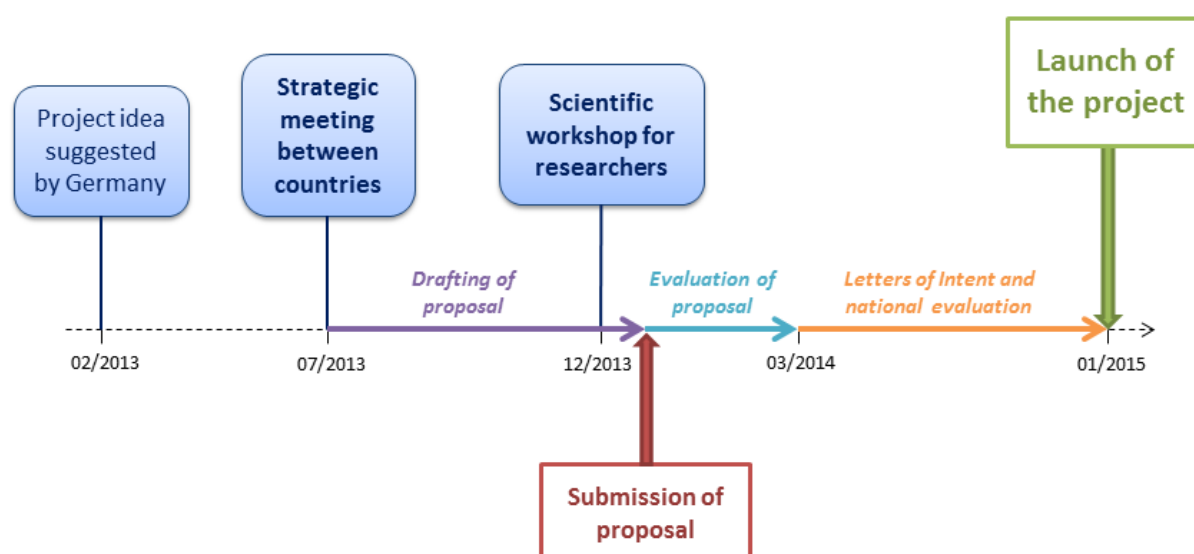
Source: Interview with John Hanus (JPI Oceans Secretariat)

As indicated in the timeline below (Fig. 2), **less than two years** were required to set up JPI Oceans' joint action once Germany had proposed to the Management Board of JPI Oceans to launch a joint action and use its ship for onsite deep-sea research. This short duration was linked to Germany's time constraint for planning the schedule of future cruises on its research vessel (see Section 5.1 below).

A first meeting took place between interested countries. Research funding providers and national scientific experts discussed and jointly agreed on the **strategic objectives** to be achieved by the joint action. The meeting gave way to a collective process for the drafting of a proposal for a joint cruise by researchers, which was finalised during a scientific workshop in December 2013. The latter brought together about 100 researchers from 25 different research institutes. The joint proposal was then submitted and evaluated by Germany with the contribution of international experts, as well as by JPI Oceans' Strategic Advisory Board, which consists of leading scientists, technologists/industrialists and representatives of civil society.

Once the joint proposal was approved both by Germany and JPI Oceans' Management Board (i.e. JPI Oceans' decision-making body), each project partner sent a Letter of Intent describing and guaranteeing its specific participation in the project (i.e. funding, scientists, and equipment provided; research activities to be implemented). These national proposals and commitments were also evaluated at national level. Due to time constraints, no formal joint call could be implemented to select proposals. Researchers were selected at national level, hence without common selection procedures and criteria across participating countries (see Section 5.1).

Figure 2. Timeline for implementation



Source: Interview with John Hanus (JPI Oceans Secretariat)

3. Principal outputs to date

As the project is still on-going and finishes in June 2018, all expected outputs have not yet been achieved. So far, the JPI Oceans project has succeeded in supporting:

- The launch of three joint research expeditions: the first one (SO-239) took place in the German, Belgian, and French license areas and, for the first time, in one of the nine protected areas defined by the ISA in the Clarion Clipperton Zone (CCZ). Samples and data were collected in order to (i) assess the ecosystem status prior to any mining activities, (ii) study the genetic connectivity between distant deep-sea populations and (iii) compare the fauna from seamounts with the fauna living attached to the nodules to evaluate if seamounts are suitable refuges and sites of recolonisation for species from mined areas. The two other expeditions (SO-242a/b) took place in the Peru Basin to revisit the DISCOL (DISturbance and re-COLONization experiment) area, where a disturbance experiment had been conducted 26 years ago to simulate mining impact. They enabled to investigate the scale of recovery and the current ecosystem and biogeochemical status of this site, in order to assess the long-term impact of mining activities.
- The development of an efficient methodology for environmental impact assessment and monitoring thanks to available technology: the joint cruise allowed to fulfil international obligations regarding the monitoring and observation of licensed areas in international waters, especially in view of contributing to mandatory baseline studies before implementing mining activities.
- The establishment of first scientific results: analyses have demonstrated the importance of nodules for deep-sea biodiversity and have revealed that effects of disturbances from mining activities on deep-sea ecosystems will likely last for many decades and impact all levels of fauna.
- The elaboration and dissemination of first recommendations for policy-makers and the industry, through which researchers affirm the need to define within mining areas preservation zones which are to be based on robust scientific criteria. So far, these recommendations have been disseminated in particular through the organisation of a workshop by JPI Oceans specifically dedicated to this matter during the EC's European Maritime Day, through the publication of two scientific articles in *Nature* and through the active communication regarding this pilot action via JPI Oceans' website.

4. Overall strengths of this tool, including key achievements

Sharing the use of a research infrastructure provides many benefits. In particular, it allows to significantly reduce costs of conducting a joint research project and greatly contributes to operational alignment and integration of different national research activities. It also creates the conditions for greater collective impact on policy-making.

4.1 Cost-effectiveness of the approach

Sharing the use of research infrastructures such as marine instrumentation platforms (e.g. Research Vessels, Remotely Operated Vehicles, Autonomous Underwater Vehicles) allows to distribute the different costs related to the implementation of a joint research project among partners, instead of duplicating them at national level. This is especially true in the field of marine research, where infrastructures and equipment are very expensive. Hence, sharing them **significantly reduces costs**. In JPI Oceans' case, Germany was able to afford the construction of a new deep-sea research vessel and was ready to offer time to use it free of charge. It was then comparatively cheap for other countries to participate in the joint research project, as they only needed to fund the participation of researchers in the cruise, the use of required equipment and the subsequent analyses in the lab. The allocation of joint project tasks was determined by researchers themselves during the drafting of the proposals, bearing in mind the financial and/or institutional resources that had been committed by their countries. For countries with limited resources, sharing such expensive infrastructure allowed their researchers to participate in a high-quality research project and to benefit from the infrastructure and equipment provided by advanced countries. In addition, Germany consolidated its leading position in research by showcasing and sharing its new cutting-edge deep-sea research vessel. It wishes to make its ship available to other research implementing organisations in order to benefit from a return on investment. Lending the research vessel for JPI Oceans' project was hence an opportunity for Germany to advertise its new infrastructure in view of setting up a barter system,

such as the existing Ocean Facilities Exchange Group (OFEG) which facilitates the exchange of marine facilities and equipment free of charge⁸⁵.

Furthermore, involving the industry has also been beneficial for research projects that require new nodule-mining equipment. Indeed, public institutions cannot afford to build such expensive equipment, whereas the industry has a high potential return on investment in the field of deep-sea mining and is hence willing to invest in this type of equipment. For example, participating members of JPI Oceans are planning to collaborate with partners from the private sector in order to benefit from newly built equipment and financial resources. In particular, this will allow to field test deep-sea nodule mining and carry out mandatory ex-ante environmental assessments.

4.2 Development of a common understanding and integration of national research activities around a common scientific objective

Through the joint use of research infrastructure, researchers participating in the project not only spent long periods of time together (i.e. at least a month for each cruise), but were on the ship together twenty-four hours a day and seven days a week during those periods of time. This approach for sharing of infrastructure, particularly specific to marine research, allows for strong **team- and trust-building amongst researchers**. There was much enthusiasm amongst scientists for participating in a joint cruise and research project: for instance several participants wrote regularly in their blogs about the cruise. Researchers were then keen to implement further research activities for joint shore-based analysis of the data collected onsite. Moreover, they had a high **common understanding of the project and its expected scientific outcomes**, thanks to team work that was greatly enhanced through the joint use of infrastructure and also thanks to the organisation of several large project conferences gathering all participants (Kick-Off Meeting in February 2015; 2nd Meeting in 2016; 3rd Meeting to come in Spring 2017; and Final Conference to come in November 2017). Thus, sharing research infrastructure greatly fostered strong cooperation and **co-creation of the research community** participating in the joint project.

Furthermore, the sharing of infrastructure enables a better integration of national research activities. Indeed, as explained above, researchers are **working as a joint team for a joint project in the same place and at the same time**, also providing the advantage of quick implementation of onsite research activities. The operational alignment and integration of research activities relies on the already existing alignment at strategic and financial levels (i.e. at the level of JPI Oceans' Management Board, which is the decision-making body of the JPI). Indeed, national representatives first need to jointly define **shared research objectives** and secure funding before addressing the operational aspect of a research project. The **bottom-up elaboration of the proposal by researchers** ensures an effective integration of various disciplines and expertise and the relevant design of research activities to be implemented with a shared infrastructure.

4.3 Standardised data collection, coordination of research methods and open access to research data

The collective use of a single research infrastructure within a joint project requires the **agreement among partners on the research methodologies and technologies** to be used. The latter relies on the identification of complementarities between national resources such as equipment, other material resources and expertise available at national levels. It enables to have access to a **diversity of cutting-edge technology and equipment**, which would not have been the case at national level. The sharing of equipment associated with the sharing of infrastructure gives broader possibilities regarding the scope and ambition of research activities and in terms of research methodologies. In particular, new technologies were made available by research-intensive countries.

In addition, the project involves joint observation, sampling and measurement. For countries that have less-advanced research capacity in the field of deep-sea research, their researchers participating in this project greatly benefited from the experience of sharing a research vessel and associated equipment. Several PhD students also took part in the joint cruise. The latter led to capacity building amongst researchers and to **standardising of data collection and analysis** within the project, enhancing the scientific quality of the project's quantitative outcomes and greatly contributing to operational alignment. For instance, as mentioned in Section 3, participating researchers jointly developed a common methodology for environmental impact assessment and monitoring. The collected data has been made easily accessible to participating researchers for its analysis. It is stored in **public**

⁸⁵ <http://www.ofeg.org/>

world-wide databases⁸⁶ and is also made available to the Legal and Technical Commission of the International Seabed Authority (ISA) to facilitate the project's contribution towards new common regulations. Hence, jointly collecting data and producing research outcomes through the collective use of research infrastructure has enhanced open access to this information, which is required for further research and policy-making.

4.4 More effective collective European contributions to international policy-making

The joint scientific understanding of the issue of deep-sea mining, greatly facilitated by the joint use of a research infrastructure, allows to provide joint recommendations for policy-makers. Indeed, JPI Oceans is seeking to **influence the global political agenda** on deep-sea mining through its pilot action. Its research is informing the International Seabed Authority (ISA), which is responsible for developing a code to regulate deep sea mining activities at the level of the United Nations. JPI Oceans has been presenting the pilot action's latest results to the ISA. JPI Oceans' work was also highlighted by the G7 Science Ministers in their Communiqué of the 2015 Summit, which affirms the importance of protecting the marine environment from potential negative effects of deep-sea mining and recalls the ISA's role regarding this issue.⁸⁷ JPI Oceans is exploring new possibilities for **international collaboration** on this matter (e.g. with North-America, Japan and New-Zealand).

5. Overall limitations with this tool, including difficulties encountered during implementation

Challenges in the implementation of the shared use of Germany's research vessel were linked to the tight deadline for applying to a joint cruise on this ship and to securing national funding commitments.

5.1 Limited time to set up the terms for sharing the research vessel

As Germany had finished building its new ship, it was already starting to plan the schedule of future cruises when the idea of a joint project on deep-sea mining emerged. A cruise schedule is usually determined years in advance: hence, if JPI Oceans wanted to benefit from the opportunity of setting up a joint cruise, a decision had to be made quickly. This is why there was not enough time to put in place a formal transnational project proposal selection through a competitive bidding system. Participating scientists were selected at national level with no common procedures. This led to difficulties regarding the contribution of certain funding agencies. Indeed, some were not allowed to financially support a research project without a competitive call for projects. Thus, the scientists of the concerned countries were only able to participate in the project with institutional funding or financial resources from other running projects⁸⁸.

However, the overall added value of having access to a newly built cutting-edge research vessel surpassed the technical issues linked to the time constraints. This was clearly demonstrated by the significant interest generated among the scientific community and the large number of researchers participating in the workshop for the preparation of the joint proposal. More anticipation would be required for a similar project in the future, as a tight schedule is not fit for long-term national strategic planning. Indeed, national research funding organisations usually require up to a year and a half in order to allocate resources to a research programme, which means that funds are not readily available. Hence, a more adapted approach would rely on a transnational open call and an international peer review to select joint research projects.

5.2 Challenging elaboration of a new funding mechanism for cross-border infrastructure sharing

The shared use of research infrastructure required the implementation of an innovative funding mechanism as the *simultaneous* use of a research vessel by several research institutes under the same project constitutes a novel approach. The national funding contributions were distributed among participating JPI Oceans members to cover all costs, however not equally as Germany provided the largest institutional and financial contributions. Only countries with enough resources could effectively finance the project, while countries with more limited budgets only provided researchers. It has required flexibility in national funding procedures in order to secure funding, especially with the absence of a joint competitive call, and has been successfully implemented with no major difficulty. This sharing approach was also easily accepted by partners as there is a long history of sharing

⁸⁶ For instance, PANGAEA is a public database in Open Access that publishes data for Earth & Environmental Science.

⁸⁷ Leaders' Declaration G7 Summit, 7–8 June 2015

⁸⁸ E.g. the European FP7 project on Managing Impacts of Deep-sea resource exploitation (MIDAS).

national research facilities with other countries free of charge through barter systems in the field of marine research and geosciences more broadly.

In comparison, the *joint construction* of a new research infrastructure owned by several countries would probably be harder to achieve. The costs involved can be extremely high in some cases, hence greatly hindering the participation of countries with limited resources. In addition, funding countries may have to address a high level of complexity in defining common rules for sharing the use of the involved transnational infrastructure among them and with others. In contrast, a barter system that allows common access to existing *national* infrastructures simplifies the management and funding of their shared use, as the latter is regulated by a single country. However, rules for transnational access to national research infrastructure may differ from one country to another and be hard to align. Hence, when building a new national research infrastructure, the country should consider adopting commonly accepted rules to regulate transnational access to this infrastructure in order to enhance barter schemes. Also, the recognition of national prestige associated with the construction of a new infrastructure such as a deep-sea research vessel would be lost if jointly build. This aspect is traditionally not neglected by countries, especially for such specific and highly needed infrastructures.

6. Conclusions: Suitability and key factors of success

The joint use of existing national research infrastructure is especially recommended in cases where **expensive research facilities or equipment are required to conduct research**. Indeed, this allows to avoid the duplication of costs for the construction or use of infrastructure at national levels, and hence to reduce them significantly. Sharing research infrastructure is usually developed for specific areas of research. Moreover, the involvement of *several* research institutes across various countries enables to **distribute all costs related to a joint research project at the transnational level**. This novel approach also effectively facilitates a **common understanding of transnational research issues and priorities** to be addressed through community building amongst researchers of different countries and integration of research activities in space and time. Capacity building and prestige related to the joint use of cutting-edge infrastructure and hence to the achievement of high quality scientific results are key motivations for researchers to participate in such transnational research activities. In addition, the enhanced team work and research quality facilitated through the joint use of infrastructure enables researchers to collectively **address transnational societal/political issues of high priority**.

Key factors of success:

1) At strategic level:

- **Develop a collaborative strategy for the sharing of research infrastructure within a specific field of research** or build on an existing one in order to promote the joint use of research infrastructure at a transnational level: this fosters the mutual understanding of common benefits of such an approach and provides the pre-conditions for enhancing its adoption in the long term.
- **Identify transnational societal/political issues of scientific nature that can be better addressed thanks to the joint use of research infrastructure**: in particular, developing a strategic platform (e.g. JPI) that facilitates the effective uptake of scientific outcomes and joint recommendations (e.g. by policy-makers, the industry, consumers, civil society, etc.) is crucial.

2) At financial level:

- **Design a funding mechanism that distributes adequately all costs amongst participating countries**: this includes costs related to the use of the research infrastructure, the participation of researchers and additional staff, the use of specific equipment, travelling, etc. In addition, setting up a joint competitive call can allow to secure more in-cash funding from countries.
- If possible, **establish public-private partnerships** in order to benefit from the industry's financial resources to fund required new equipment.

3) At operational level:

- **Adopt a bottom-up approach that fosters strong involvement of researchers in designing the operationalisation of the joint use of infrastructure**: this ensures a balanced and relevant allocation of related research tasks amongst participating research institutes according to their available resources (i.e. in-cash and institutional contributions) and to their specific expertise.
- **Implement a centralised monitoring** of the joint use of research infrastructure by the national owner.
- **Carry out community building activities amongst researchers** in order for the transnational research project to fully benefit from the joint use of research infrastructure (e.g. by setting up large project meetings that gather all participants): this allows participating researchers to develop a mutual understanding of the project's goals, activities and outcomes.
- **Ensure open access to generated data and results**: this increases the transnational added value of jointly using a research infrastructure and provides a transparent and effective scientific input towards transnational policy-making, standardisation activities, etc.

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PANGAEA: <https://www.pangaea.de/>

Interviews

John Hanus: JPI Oceans Secretariat

Norbert Blum: Project Manager - Jülich

ANNEX 1. JOINT PROGRAMMING INITIATIVE HEALTHY AND PRODUCTIVE SEAS AND OCEANS⁸⁹

The Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans) is a coordinating and integrating platform, open to all EU Member States and Associated Countries. JPI Oceans aims to align the marine and maritime research and innovation landscape in Europe and focuses on making better and more efficient use of national research budgets, which represent 88% of the research funding within Europe. One of JPI Oceans' goals is to develop joint research programmes in which countries can be involved on a voluntary basis (variable geometry). Participating countries also decide what contribution to make: this may include institutional, project-related or new funding.

Member-States of JPI Oceans have jointly identified three main goals which address the intersections between the marine environment, climate change and the maritime economy through observations, infrastructure, technologies and human capacities:

- Enable the advent of a knowledge based maritime economy, maximizing its value in a sustainable way
- Ensure Good Environmental Status of the seas and optimize planning of activities in the marine space
- Optimize the response to climate change and mitigate human impacts on the marine environment

In December 2014, JPI Oceans adopted its Strategic Research and Innovation Agenda (SRIA). The SRIA outlines ten areas of strategic priority, which were identified through an extensive consultation process and with advice from the Strategic Advisory Board of JPI Oceans. These strategic areas are:

1. Exploring the deep seas.
2. Technology and sensor development.
3. Science support to coastal and maritime planning and management.
4. Linking oceans, human health and wellbeing.
5. Interdisciplinary research for Good Environmental Status.
6. Observing, modelling and predicting oceans state and processes.
7. Climate change impact on physical and biological ocean processes – Oceans circulation.
8. Effects of ocean acidification and warming on marine ecosystems.
9. Food security and safety driving innovation in a changing world.
10. Use of marine biological resources through development and application of biotechnology.

In the consultation three cross-cutting areas reflecting JPI Oceans' vision were identified as critical and are to be embedded within the actions of JPI Oceans in order to enhance its impact: (i) Science-Policy, (ii) Human Capacity Building and (iii) Infrastructures: Shared Use and Common Procurement Strategies.

JPI OCEANS VISION: *To enable Blue Growth and jobs, whilst fostering the health and productivity of seas and oceans and addressing the pressures of climate change and human impacts on the oceans.*

JPI OCEANS MISSION: *To align national research programmes and budgets by avoiding fragmentation and unnecessary duplication, planning common and flexible research initiatives, facilitating cooperation and foresight, and establishing efficient mechanisms for interaction and knowledge transfer between the scientific community, industry & services, and policy makers at high level in order to address European marine and maritime challenges.*

JPI OCEANS IMPLEMENTATION PROCESS: So far, JPI Oceans has launched four joint pilot actions:

- 1) Multi-use of infrastructure for monitoring;
- 2) Ecological aspects of microplastics in the marine environment;
- 3) Ecological aspects of deep-sea mining;
- 4) Intercalibration for the EU Water Framework Directive.

⁸⁹ <http://www.jpi-oceans.eu/what-jpi-oceans>; JPI Oceans Strategic Research and Innovation Agenda; JPIO Oceans Draft Implementation Plan

ANNEX 2. JPI OCEANS' GENERAL APPROACH TOWARDS MARINE INFRASTRUCTURE SHARING⁹⁰

The shared use of research infrastructures is a cross-cutting issue which can benefit from the new cooperation mechanism offered in the framework of JPI Oceans. A high political commitment and dialogue between relevant authorities is required to ensure sustainable and cost-effective observing systems: JPI Oceans offers a platform for such a dialogue to **develop common procurement strategies and associated business plans**. These can be adapted for the optimal use of costly infrastructures, by bringing together relevant authorities/ users.

Initiative 1: Development of a common vision for marine research infrastructure shared use and access

Cross-border access at European level is usually intended to offer the best suited infrastructures to EU scientists. This contributes to the optimal use of existing infrastructures. The transnational access opportunities offered by various Framework Programmes projects are welcomed by scientists, but are limited in size and ambition.

The development of a common vision and actions for marine research infrastructure use and access in the framework of JPI Oceans would ensure cost effective coordination between science, monitoring needs and research infrastructure support. Depending on the research needs, shared use of infrastructure could be addressed either at regional scale, at pan-European level or even with the two dimensions combined for an optimal efficiency.

When appropriate, it may be effective to establish public-private partnerships. The shared use and access issue is particularly important in the field of research vessels, autonomous observing systems, marine laboratory coastal stations, experimental facilities for research in aquaculture and land-based facilities for ocean engineering. Not to mention the marine data issue which needs a shared vision of the e-infrastructures needed and will facilitate accessing and knowledge sharing, as well as agreements at Member State level for more data exchange .

Initiative 2: Set up common procurement strategies, develop common business plans

JPI Oceans can overcome the unconnected nature of decisions relating to larger investments in the field of research and monitoring infrastructures. This action would help to streamline and harmonise national infrastructures roadmaps. Developing common procurement strategies and business models would harness economies of scale, shared investment risk, standardisation and interoperability.

This action is particularly important in the field of research vessels. There is a need for strategic reassessment and coordination at European level of the oceanographic vessels as part of a broader European approach to marine research infrastructures. JPI Oceans could coordinate this assessment with member countries, the European Commission and existing initiatives.

Longer term public-private partnerships can be developed in the framework of JPI Oceans. Public-private partnerships are already in operation in Europe within the marine research communities, mainly regarding operation of robotic vehicles. Industry cooperates closely with governments and research institutes in the design and development of new Research Vessels, Remotely Operated Vehicles and Autonomous Underwater Vehicles.

Initiative 3: Strengthen land-based facilities and develop *in situ* testing sites for ocean engineering, shipbuilding, ocean energy, sub-sea technologies and instrumentation

Land-based testing sites allow marine technology to be tested under a range of conditions before being deployed into the ocean. Facilities include deep wave basins and wave flumes, water circulation canals, hyperbaric tanks, shock and vibration generators, climatic rooms, calibration laboratories.

These facilities are essential in developing technology for the deep-sea, monitoring and many types of ocean engineering projects. Joint actions at European level can make real progress to:

- Facilitate trans-national access to facilities to establish a European network of infrastructures;
- Support the design and development of new sub-sea technologies and common prototypes for both research and commercial uses with the maritime community;
- Develop a shared and clear vision for in situ testing site development.

⁹⁰ JPIO Oceans Draft Implementation Plan



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.6- FACCE JPI Joint Mapping Meetings

Due date of deliverable: April 2016

Actual submission date: September 2016

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, methodology and overall strengths and difficulties in implementing an essential step of the Joint Programming Process, namely Joint Mapping of existing and planned national research initiatives in a specific field. The case focuses in particular on the **Joint Mapping exercise conducted in the context of the Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI)**. FACCE JPI's mapping methodology relied on **Mapping Meetings**, which brought together delegated national policy, funding and research representatives who exchanged information and views, identified joint programming opportunities and developed a common vision regarding future transnational research priorities. Joint mapping is a **pre-requisite for fostering cross-border alignment at strategic/policy level**, as well as for assessing the potential for financial and operational alignment. While focusing on the specific experience of FACCE JPI, the case study also provides lessons for other public-to-public research partnerships (P2Ps) wishing to develop a similar approach. The case study does however not aim to provide an in-depth assessment of FACCE JPI's joint mapping approach.

The study highlights the benefits of this joint mapping exercise. FACCE JPI's joint mapping provided a **common mapping methodology** to FACCE JPI member-countries, which facilitated the development of an overall picture of national research activities in the FACCE JPI remit (i.e. scientific scope, key players involved and resources provided). This exercise allowed to **identify research gaps and potential synergies** in specific research areas of common interest, and hence to **inform decision-makers of potential transnational strategic priorities** and related research activities to be implemented jointly. Furthermore, mapping meetings relied on a **time-efficient, participatory and interactive** approach, enhancing greater involvement of and ownership by FACCE JPI members. They facilitated networking amongst research and funding/policy experts, and the development of a collective critical analysis of collected mapping data. FACCE JPI used other mapping tools (i.e. desk studies, online surveys, bibliometric analysis) in addition to Mapping Meetings in order to generate comprehensive quantitative and qualitative mapping data. An effective feedback loop and dissemination of the mapping methodology to other P2Ps was also ensured.

Yet, FACCE JPI was also confronted with: (i) the difficulty in achieving a common understanding about the exact scope of the mapping exercise; (ii) heterogeneous information provided by participating countries due to the interdisciplinary scientific scope of FACCE JPI, the diversity of funding agencies and national research programmes and the variable involvement of participants; and (iii) the rapid obsolescence of mapping results, which could be addressed via a regular updating process.

The case study builds on the ERA-LEARN 2020 Task 4.1 ("Definition and Typology of Alignment"), and relies on a review of existing literature and an interview with a member of the FACCE JPI Secretariat who was in charge of facilitating the joint mapping activities. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 "Assessment of Current Approaches to Alignment". The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.). The focus of the following case study (i.e. joint mapping) can also be considered as part of the Framework Conditions of Joint Programming, several of which are also analysed in the ERA-LEARN 2020 Task 2.2 ("Support for implementation of Framework Conditions for the JPI community").

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat / Institut National de la Recherche Agronomique (INRA). The author is grateful to Pablo Aller Morán (FACCE JPI Secretariat, former member of the Work Package 2 "Mapping and Foresight for Strategic Collaboration" of the Coordination and Support Action "FACCE-CSA" 2011-2014 / Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, INIA) for his valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, methodology and overall strengths and difficulties in implementing an essential step of the Joint Programming Process, namely Joint Mapping of existing and planned national (and European) research initiatives in a specific field. The case focuses in particular on the **Joint Mapping exercise** conducted in the context of the *Joint Programming Initiative on Agriculture, Food Security and Climate Change* (FACCE-JPI).

Joint mapping is a **pre-requisite for effective joint programming** and for fostering **alignment at strategic/policy level**. It facilitates the joint elaboration of a Strategic Research Agenda, which is the common base required among countries in order for them to collectively agree on potential areas of cooperation and on joint research actions to be carried forward.

This study assesses how such an approach is best used for promoting greater alignment of national research strategies, programmes and activities. While focusing on the specific experience of FACCE-JPI's mapping activity, the case also provides **lessons for other JPIs and public-to-public (P2P) research networks wishing to develop a similar approach**.

According to the Typology of Alignment, joint mapping is generally carried out by JPI members during the preparatory or research planning phase in order to identify and map on-going and planned national research activities and programmes, and identify research gaps and potential synergies amongst participating countries. This joint analysis mainly involves national policymakers from one or more Ministries as well as representatives from research funding organisations.

2. Key features of FACCE JPI's joint mapping approach

2.1 Overview

The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) was launched in 2010. It brings together 22 countries⁹¹ and provides coordination support for joint research actions addressing the interconnected challenges of sustainable agriculture, food security and climate change (see Annex 5). FACCE-JPI has identified five Core research Themes which are of high priority to its member-countries:

1. Sustainable food security under climate change (overarching theme)
2. Environmentally sustainable intensification of agricultural systems
3. Developing synergies and reducing trade-offs between food supply, biodiversity and ecosystem services
4. Adaptation to climate change
5. Mitigation of climate change

In order to define potential fields of cooperation and common research priorities, a specific Work Package of the first Coordination and Support Action (CSA) that supported the implementation of FACCE's activities⁹² was focused on the coordination of the mapping of on-going and planned national, transnational and EU research and innovation programmes. This process facilitated the identification of current and expected research synergies, duplications and gaps. In particular, FACCE member countries conducted five mapping exercises over two years (2011-2013), each of them addressing one of the five Core Themes listed above. Their outcomes greatly contributed to the development of FACCE-JPI's Strategic Research Agenda (SRA) and First Biennial Implementation Plan (IP 2014-2015). These so-called *Mapping Meetings* brought together delegated national policy, funding and research representatives in order for them to exchange information and views, identify joint programming opportunities and create a common vision amongst member countries.⁹³

2.2 Methodology

The mapping methodology adopted by FACCE-JPI relied on Mapping Meetings, in addition to other types of mapping activities such as desk studies and surveys. The main objectives of the mapping meetings were to: i) map

⁹¹ Austria, Belgium, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Ireland, Israel, Italy, The Netherlands, Norway, Poland, Romania, Spain, Sweden, Switzerland, Turkey and United Kingdom; New Zealand is an Associate Member.

⁹² WP2 "*Mapping and Foresight for Strategic Collaboration*" of the "FACCE-CSA" 2011-2014

⁹³ Report of FACCE-JPI Mapping and Foresight dissemination activity (February 2014)

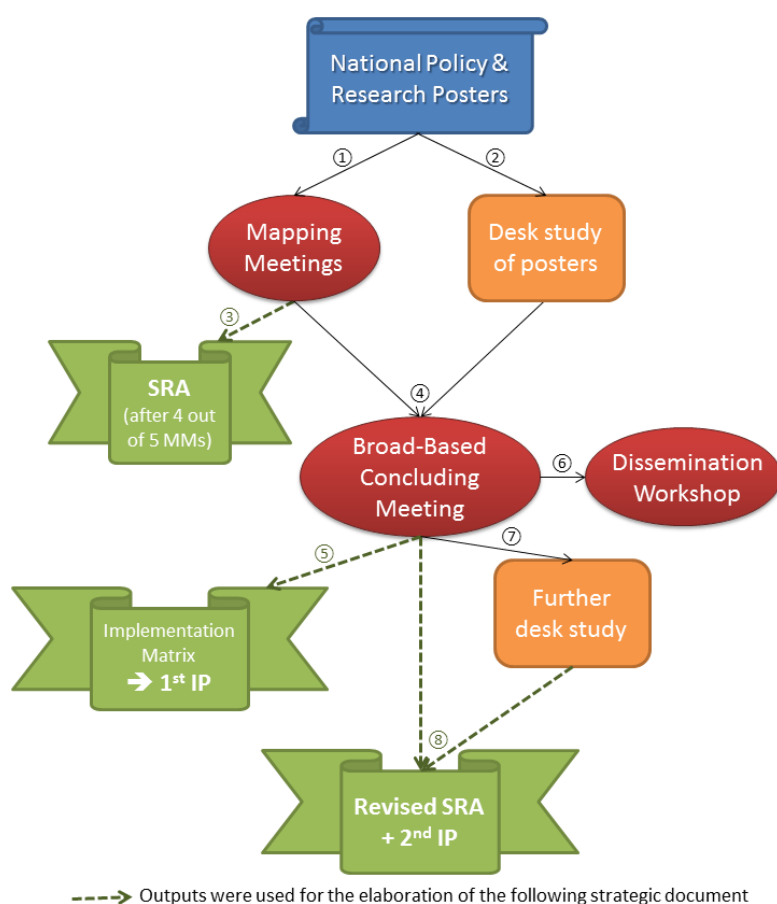
the current and planned national research programmes and activities in FACCE JPI member countries; ii) identify complementarities, overlaps and gaps in current and future research programs; iii) exchange information regarding current national research policy trends; iv) identify areas where coordination, cooperation and exchanges (of information, people, good practices) had to be improved; v) create a framework for networking and new partnerships; vi) define current perspectives and future/potential research resources available in Europe (funding, facilities and human capital) and vii) suggest priorities for the implementation of joint programming activities.⁹⁴ The key steps involved included (see Fig. 1 below):

- Preparation of national posters;
- Mapping Meetings (MMs) with break-out sessions;
- Desk study of posters.

To conclude and complete this mapping exercise, FACCE member countries carried out three additional activities:

- The Broad-Based Concluding Meeting⁹⁵;
- Further study on policy and funding data collected in national posters⁹⁶;
- The Mapping Meetings Dissemination Workshop⁹⁷.

Figure 1. Main steps involved in FACCE JPI's joint mapping process



Source: Own compilation

⁹⁴ Report of FACCE-JPI Mapping and Foresight dissemination activity (February 2014)

⁹⁵ Reports of the Mapping Meetings and Broad-Based Concluding Meeting are available at:

<https://www.faccejpi.com/Document-library/Mapping-meeting-reports>

⁹⁶ FACCE-JPI (2014). Report of FACCE-JPI Mapping and Foresight Further study on Mapping Meetings' Policy & Funding Data.

⁹⁷ FACCE-JPI (2014). Report of FACCE-JPI Mapping and Foresight dissemination activity – Mapping Meetings – Dissemination Workshop.

This mapping approach was novel as it combined data collection and analysis – which included the use of an innovative poster tool compared to traditional surveys and questionnaires – with collective discussions around the collected data for greater involvement of member countries.

Preparation of national posters

Each FACCE-JPI country was asked to fill in two pre-designed posters (see examples of posters in Annex 1):

- The “Policy Poster”, which provided information on the main national research funders, national research and innovation programmes and associated research implementing organisations, and other transnational programmes the country was involved in (e.g. EU projects, JPIs, international programmes);
- The “Research Poster”, which provided information regarding current national research projects and associated research efforts in various agricultural sectors (livestock, crops and/or forestry).

Mapping Meetings with break-out sessions

Each Mapping Meeting lasted two days and focused on one specific FACCE Core Theme. It gathered the national policy and research experts who had completed the posters. Break-out sessions were organised in order to analyse and compare national posters (see Annex 2). They were then concluded by a final discussion during which experts jointly presented and refined recommendations on (i) research priorities to be addressed jointly via FACCE-JPI and (ii) associated joint research actions and tools to be implemented.

Desk study of research posters

After each mapping meeting, a desk study was conducted on the data collected in the research posters. This enabled a more quantitative approach in order to confirm research gaps, overlaps and complementarities identified during the meetings and potentially identify new ones.

Moreover, a bibliometric analysis was carried out for the first Mapping Meeting in order to support the latter’s outcomes with the results of a more traditional methodology.

The Broad-Based Concluding Meeting

This final meeting provided an overall vision of the five Mapping Meetings and helped member countries jointly develop concrete contributions for the elaboration of the First FACCE-JPI Biennial Implementation Plan, which listed the priority joint actions to be carried out during 2014-2015 – and the updated version of the Strategic Research Agenda. In particular, an Implementation Matrix was developed as a major input towards the FACCE-JPI Implementation Plan. It distinguished between three categories of research areas/topics:

- (1) Mature research areas, where further alignment and consolidation would be warranted;
- (2) Emerging research subjects requiring the implementation of joint exploratory and scoping work;
- (3) Research areas where there was a need for new European research, and which could benefit from the joint use of funding instruments for collaborative projects, ERA-NETs and joint infrastructures.

During the Broad-Based Concluding Meeting, discussion sessions took place to address cross-thematic issues (regional aspects, scale and chain, end-users, open data access and standardization) and the three categories of the Implementation Matrix. Moreover, a “stickers session” enabled participants to indicate the support of their country/institution to specific research areas by placing stickers within the Implementation Matrix’s categories (see Annex 3 for more information). An associated desk study was hence able to provide a broad picture of the main priorities and needs of participating countries.⁹⁸

Further study on policy and funding data collected in national posters

A complementary study was carried out after the Mapping Meetings. It provided a more in-depth analysis of the information collected in the policy posters country by country. It also evaluated the answers of FACCE countries

⁹⁸ Report of FACCE-JPI Mapping and Foresight – Broad-Based Concluding Meeting (June 2013)

to an online survey which referred to current as well as future research funding scenarios.⁹⁹ The outcomes of this study were taken into account in the updated version of FACCE JPI's SRA published in December 2015.

The Mapping Meetings Dissemination Workshop

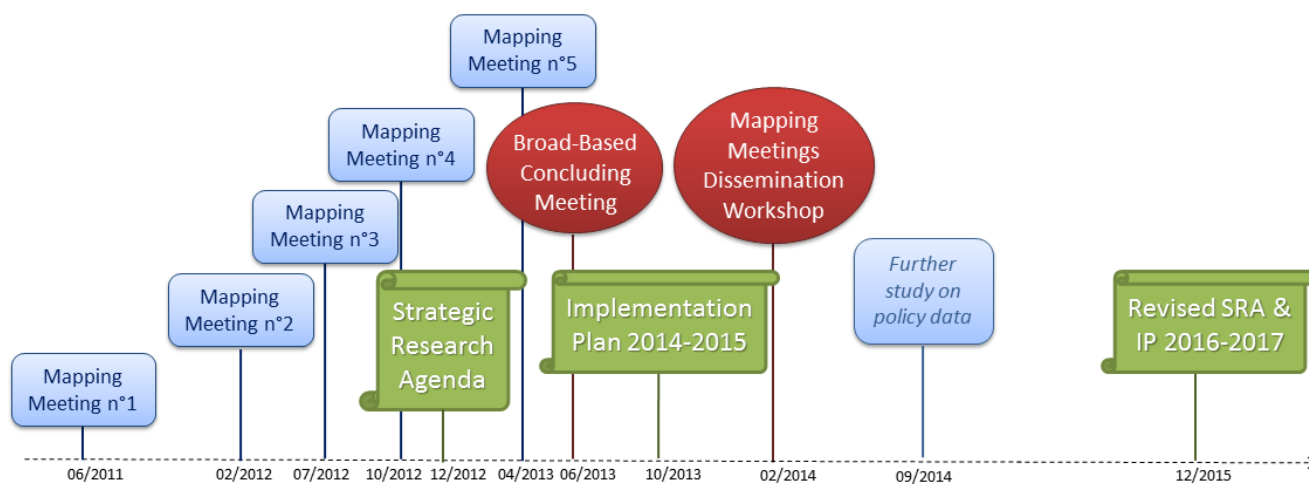
This dissemination event brought together representatives from eight JPIs. It was organised by FACCE JPI in order to share the Mapping Meeting concept and methodology with other JPIs, identify best practices in order to conduct mapping and foresight activities and discuss the various mapping tools and approaches used by JPIs (see outcomes of the workshop in Annex 4).

2.3 Approximate resources and time needed for implementation

The joint mapping activity implemented by FACCE JPI was financially supported by the EC's first Coordination and Support Action (FACCE-CSA) and members' own budgets.¹⁰⁰ In terms of human resources, each of the mapping meetings, including the Broad-Based Concluding Meeting, required an average of 3.5 Person-Months in order to prepare and execute the mapping meeting and analyse its results. Hence, the total effort performed over two years between 2011 and 2013 (see Fig. 2) was of 21 PM. In addition, the Mapping Meetings Dissemination Workshop and the Further Study on policy and funding data required 3.5 PM, leading to a total of 24.5 PM over three years and four months.

As illustrated above in Figure 1, the outcomes of the first four Mapping Meetings contributed to the development of FACCE JPI's Strategic Research Agenda published in 2012. The last Mapping Meeting and the Broad-Based Concluding Meeting provided inputs towards the elaboration of the First Biennial Implementation Plan. Moreover, the additional desk study conducted in September 2014 fed into FACCE JPI's updated SRA and Second Biennial Implementation Plan (2016-2018), both published in December 2015. Mapping Meeting n°1 focused on FACCE Core Theme "Mitigation of climate change"; Mapping Meeting n°2 on "Adaptation to climate change"; Mapping Meeting n°3 on "Developing synergies and reducing trade-offs between food supply, biodiversity and ecosystem services"; Mapping Meeting n°4 on FACCE JPI's overarching Core Theme "Sustainable food security under climate change" in order to provide appropriate inputs towards the Strategic Research Agenda; and Mapping Meeting n°5 on "Environmentally sustainable intensification of agricultural systems".

Figure 2. Timeline for implementation



Source: Report of FACCE-JPI Mapping and Foresight dissemination activity (February 2014), Interview

⁹⁹ Further study on Mapping Meetings' Policy & Funding Data in view of the Implementation Plan 2014-2015 (September 2014)

¹⁰⁰ Each Mapping Meeting, including the Broad-Based Concluding Meeting, had an average cost of 5.500€ (excluding personal costs). The costs related to the Mapping Meetings Dissemination Workshop were lower as the event lasted only one day and gathered fewer participants. The total cost of these events amounted to approximately 35.000€ (excluding personal costs).

3. Overall strengths of this approach, including key achievements

The innovative mapping methodology developed and implemented by FACCE-JPI provided fundamental pre-requisites for further alignment at strategic, financial and operational levels. It relied on a participatory approach consisting of mapping meetings, complemented by other mapping instruments (i.e. desk studies, online surveys and bibliometric analysis).

3.1 *Development of an essential basis for strategic/policy alignment across countries*

The implementation of a mapping activity is a necessary precondition for identifying potential areas of research where joint actions can be developed. Its outcomes form an **overall picture of current national research activities** and highlight potential synergies and existing research gaps. Joint mapping can be considered as an alignment activity in itself as it facilitates the agreement on and joint establishment of a **common framework for mapping research activities at national level**. In FACCE-JPI's case, the format of the posters had been designed and adapted after each Mapping Meeting to collect relevant and targeted information for the mapping objective.

Mapping outcomes provide practical information regarding current research activities (i.e. main national funders and research institutes, national research programmes and allocated budgets, human and financial resources invested per research area at national level, etc.). The latter complements strategic visions developed thanks to foresight activities¹⁰¹, allowing participating countries to collectively make informed decisions regarding future transnational research priorities. For instance, in FACCE JPI's case, the stickers' session which took place during the Broad-Based Concluding Meeting enabled a collective prioritisation of research areas to be addressed through FACCE-JPI. This last meeting provided **direct inputs for joint strategic documents (SRA and IP 2014-2015)**. Thus, mapping can be considered as the first strategic alignment activity in the joint programming cycle when given a broader objective (i.e. agreement on common research priorities and joint research actions) than mapping in its stricter definition. It is a **necessary step for further alignment at strategic/policy level, as well as at financial and operational levels** as it allows to identify financial and scientific resources available across countries.

3.2 *A time-efficient, participatory and interactive approach*

FACCE-JPI's mapping approach relied on the development of an innovative Mapping Meeting tool. The first advantage of such a tool is its **time efficiency**: as meeting dates are fixed, results are obtained within a short period of time, for instance compared to a more typical approach with the use of questionnaires which can trigger delays if waiting for responses. Countries which had agreed to participate in mapping meetings first showed their interest in a joint mapping process and hence understood the need to provide the required information in time for the mapping meeting in order to be able to effectively elaborate the latter's expected outcomes. However, if no recent data is available regarding current knowledge status and national research strategies, foresight activities and the distribution of a more exhaustive questionnaire amongst a large number of scientists, funding providers and stakeholders may be required before implementing more targeted mapping activities such as Mapping Meetings.

More importantly, **the mapping meeting approach allows to spur a dialogue and a first collaboration amongst member-countries, providing a networking opportunity amongst participating scientists on the one hand, amongst funders/policy-makers on the other hand, and between both groups**. Mapping Meeting reports indicate the enthusiasm that participants showed during the meetings, illustrating their strong desire of involvement in this mapping approach. The Break-out sessions gave way for a critical analysis of the information collected in the mapping posters that was jointly led by countries (see Annex 3 for more information). The **active participation of two types of national representatives** (policy-makers/funding providers and scientists) ensured the quality of the information provided by combining perspectives on (i) national strategic research priorities, (ii) financial resources provided to support them and (iii) their operational implementation at the institutional level. Moreover, the inputs of these national representatives allowed an effective identification of possible alignment actions across countries. These actions were considered to be addressing common research priorities and at the same time to be feasible at the operational level.

¹⁰¹ The Steering Committee on Agricultural Research's (SCAR) joint foresight reviews provided initial inputs towards the development of a common vision amongst FACCE JPI members.

3.3 Generation of comprehensive quantitative and qualitative data via the use of various mapping tools

As highlighted in the Section 2.2, FACCE-JPI's methodology did not only rely on the outcomes of the mapping meetings alone:

- Desk studies conducted with the data provided in the national policy and research posters gave **quantitative results regarding research gaps, overlaps and complementarities**;
- The survey launched after all five mapping meetings allowed to know more about aspects that had not yet been discussed, such as **future national trends** of policy support in FACCE JPI research areas;
- The bibliometric analysis led for the first mapping meeting provided **quantitative and high quality information concerning past trends in research** at institute, country, discipline and publication levels, hence completing findings of other mapping tools on current and potential trends.¹⁰²

By combining various types of mapping instruments, FACCE-JPI was able to generate comprehensive results, which were used as direct inputs for strategic documents (SRA, IP).

3.4 Effective feedback loop and dissemination of the mapping methodology to other P2Ps

The design of mapping meetings was a **“learning by doing” process**. FACCE-JPI developed an evaluation procedure applied during the first mapping exercise in order to use the lessons learned for the following mapping meetings. A technical group was established before this first meeting in order to develop an evaluation methodology. **Observers** who had attended the first meeting gave their feedback concerning the mapping process, in addition to the answers provided by the questionnaire that was circulated to all participants. In particular, this enabled to improve the poster formats provided for the 4th and 5th Mapping Meetings compared to the first Mapping Meetings. Moreover, meeting reports were elaborated shortly after the meetings in order to disseminate and analyse the meeting outcomes. This “learning by doing” approach also allowed to identify missing information that had not been provided during the Mapping Meetings. Therefore, the last deliverable published by FACCE-CSA WP2 consisted in an additional desk study that was conducted in order to collect more policy data.

Furthermore, the **Mapping Meetings Dissemination Workshop** was also part of the evaluation process as it enabled to identify best practices to conduct joint mapping activities. It succeeded in disseminating the Mapping Meeting methodology¹⁰³ and comparing it with other approaches adopted by JPIs. This event was hence not only valuable for FACCE JPI, but also for other JPIs who were then able to use the outcomes of the workshop and adapt them to their own mapping requirements.

4. Overall limitations with this approach, including difficulties encountered during implementation

Achieving reliable mapping results highly depend on the definition process of the research topics addressed and the quality of the information collected. Moreover, mapping results are only up-to-date and valid for a certain period of time, which raises the question of their updating.

4.1 Difficulty in achieving a common understanding about the exact scope of the mapping exercise

The research topics listed on national posters varied largely across countries, showing a diverging understanding of the exact scope of each FACCE JPI Core Theme. For instance, some national research programmes could relate to several research areas at the same time such as climate change mitigation and adaptation. On the other hand, a lack of information regarding precise objectives of other research programmes or projects triggered difficulties in attributing them to a specific Core Theme, as FACCE Core Themes can be considered as very broad and with overlapping boundaries. Hence, discussions among participants were necessary in order to clearly define the scope and boundaries of each Core Theme and the research topics they each covered.

¹⁰² First FACCE-JPI Mapping Meeting Report (June 2011)

¹⁰³ The Report of the Mapping Meetings Dissemination Workshop provides an overall description of FACCE JPI's mapping approach and related benefits.

4.2 Heterogeneity in the information provided by participating countries

Mapping results highly depend on what has been precisely mapped, how it has been mapped and what level of detail was required. Regarding the first Mapping Meeting, some participants considered that the pre-formatted posters did not allow the collection of sufficiently detailed information and that the time given during the meetings was too short to carry out a complete analysis of the posters.¹⁰⁴ This feedback was taken into account in order to improve the poster and workshop format for following Mapping Meetings (see Section 3.4 above).

Moreover, for FACCE-JPI and more generally for all joint programming initiatives and other public-to-public networks addressing broad challenges, their broad scope may diminish the quality of mapping results. Indeed, the wealth of information collected during the FACCE mapping exercise and its lack of comparability across countries hindered the joint development of a clear overall view and comparison of national research activities undertaken in the FACCE-JPI remit. In particular, although the format of policy posters had been designed to collect relevant and targeted information, the data provided was hard to analyse due to the **heterogeneity and diversity of funding agencies and national research programmes**.¹⁰⁵ The collection of accurate and complete sets of data highly depended on the active involvement of participants. This is indeed crucial for a collaborative exercise such as Mapping Meetings as they require a time-consuming procedure that implies a large number of people and aims to collect numerous data. Hence, as explained in Section 2.2, additional desk work was required in order to analyse outcomes of the mapping meetings and collect missing information.

4.3 Rapid obsolescence of mapping results

Mapping is an essential step in the Joint Programming process to understand in which research areas national research programmes can be coordinated and aligned. Thus, it is fundamental to have access to the most recent information concerning current research activities and national priorities. Knowing that research projects are in constant evolution, mapping results obtained at a precise moment will be quickly outdated, which is a difficult challenge for joint programming. This evolving reality implies a necessary regular updating of the joint Strategic Research Agenda (or other joint strategic documents), and hence a regular – if not continuous – mapping of national (and European) research activities.¹⁰⁶ This guarantees the relevance of joint programming over time. Mapping Meetings may not be most suited for regular/continuous monitoring of research activities and outcomes as they require a complex organisation, which may be burdensome to implement on a frequent basis. Appropriate tools for the updating of mapping results would require a more manageable operation (e.g. partially automated) and provide outputs that can easily be taken into account in the short-term timeframe of the Joint Programming cycle (e.g. contribution towards Implementation Plans).

¹⁰⁴ First FACCE-JPI Mapping Meeting Report (June 2011)

¹⁰⁵ Further study on Mapping Meetings' Policy & Funding Data in view of the Implementation Plan 2014-2015 (September 2014)

¹⁰⁶ Report of FACCE-JPI Mapping and Foresight dissemination activity (February 2014)

5. Conclusions: Suitability and key factors of success

Joint mapping is an essential first step in the Joint Programming cycle. It allows participating countries to collectively agree on a common mapping framework of national research activities. It also facilitates alignment at **strategic/policy levels** through the identification of research gaps and possible synergies across countries, and subsequently facilitates agreement on common research priorities to be addressed jointly (via a common SRA and IP). Moreover, it also assesses the **potential for financial and operational alignment** through the mapping of funding and scientific resources. Mapping outcomes have to be integrated in a decision-making process. Hence, a joint mapping procedure is **crucial at the beginning of any type of joint programming initiative and should also be carried out on a regular basis** for the updating of mapping results and the adaptation of joint activities if necessary. It can also be implemented continuously if its objective is an accurate monitoring of research activities across countries.

Key factors of success:

1) At strategic level:

- **Clearly define the objective of the mapping exercise** according to beneficiaries, the nature of expected outcomes (e.g. monitoring database, inputs towards a Strategic Research Agenda) and the associated type of information needed. The geographical scale should also be taken into account: for instance, carrying out a mapping at national level enables the provision of more detailed information; integrating global issues and the mapping of research activities outside Europe can also promote international collaboration.
- **Clearly define the scientific scope of the mapped research activities:** according to the objectives of the mapping exercise and the level of detail required, a broad mapping can be carried out at the level of the overall theme of a JPI. An alternative approach can be the division of this overall theme into several smaller sub-themes and a mapping at this scale (as was done for FACCE-JPI).

2) At operational level:

- **Implement a participatory and interactive mapping approach** involving various experts and stakeholders: the participation of qualified participants (especially scientific, policy and funding experts, as well as end-users and the private sector when deemed relevant in the identification of transnational research needs) allows for a higher quality and a greater amount of collected information (e.g. in mapping posters) and mapping results after joint analysis and discussion (e.g. during mapping meetings). A participatory approach is of high value for further alignment as it enhances the involvement of and ownership by member-countries and aims to facilitate the joint elaboration of inputs towards a common Strategic Research Agenda and the collective identification of potential joint actions.
- **Foster an active involvement of participants:** this is crucial for the implementation of a collaborative mapping process as it ensures to collect the data required in order to effectively identify research gaps and potential synergies among participating countries.
- **Combine different mapping instruments** in order to obtain comprehensive information: instruments should be carefully chosen according to the research area and the ambition of the mapping exercise. The main tools used for mapping can be questionnaires, surveys, mapping meetings, bibliometric research, analysis of national data, literature review and targeted interviews. The choice of tools should be supported by specialists who can provide useful inputs regarding the methodology and the type of information to ask for.
- **Ensure a high quality coordination, facilitation and evaluation of mapping activities** with professional help if needed.
- **Ensure effective procedures to take account of mapping outcomes in joint strategic and operational JPI documents:** giving a broader and more strategic objective to the mapping activity (e.g. by providing direct inputs for a Strategic Research Agenda) enables an efficient link between the mapping of current activities and the identification of potential research areas to be addressed through joint actions.
- **Renew joint mapping activities as often as necessary** or as a continuous process in order to monitor new national research activities and programmes.

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FACCE-JPI: <https://www.faccejpi.com/>

Interview

Pablo Aller Morán: FACCE JPI Secretariat (Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria)

ANNEX 1. EXAMPLES OF NATIONAL POLICY AND RESEARCH POSTERS

Before each mapping meeting, FACCE member-countries were responsible for the mapping of their own national research programmes and activities. According to the decision of FACCE-JPI's Governing Board, they each designated national science and policy delegates who were in charge of filling out the pre-formatted mapping posters designed by the Work Package 2 "*Mapping and Foresight for Strategic Collaboration*" of the FACCE-Coordination and Support Action.¹⁰⁷

National policy posters:

As illustrated below with the example of Austria, policy poster provide background information on national research policies, and funding organisations and programmes as well as research performing organisations related to the addressed Core Theme. European and international partnerships are also mentioned in order to map current transnational research programmes.

National research posters:

Main national research projects are listed in order to identify research gaps and complementarities when comparing all national research posters. For most of the Core Themes, research posters list projects per sector (e.g. plant production, animal production, forestry) and projects dealing with horizontal aspects such as socio-economic issues, regionalisation, infrastructures and sustainability. National research efforts were estimated per sector with the total number of national projects, the amount of funding provided and the number of person months per year in order to have comparable figures across countries.¹⁰⁸

The posters provided below give an illustration of the content of a policy poster (first poster) and a research poster (second poster). These were drafted by the delegates of Austria for the 5th Mapping Meeting, dealing with Core Theme 2 "Environmentally sustainable growth and intensification of agriculture".¹⁰⁹ The format of the posters was improved after the first Mapping Meetings, which is why they were more refined and relevant for the 4th and 5th Mapping Meetings.

¹⁰⁷ Report of FACCE-JPI Mapping and Foresight dissemination activity (February 2014)

¹⁰⁸ First FACCE-JPI Mapping Meeting Report (June 2011)

¹⁰⁹ Second FACCE-JPI Mapping Meeting Report (February 2012)

POLICY & FUNDING INFORMATION: Environmentally sustainable growth and intensification of agriculture

AUSTRIA



NATIONAL FUNDERS

Main National Funders on research, innovation and knowledge transfer on the addressed area (Ministries, Agencies, Councils or Private stakeholders).

Names of main National Funders

(for agencies and councils indicate the Ministry they are related to)

Contact details

- Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)
- Federal Ministry for Science and Research (BMWF): basic funding of universities, of the Austrian Science Fund (FWF), and the Austrian Academy of Sciences (ÖAW)
- Federal Ministry for Transport, Innovation and Technology (BMVIT)
- Federal Ministry of Economy, Family and Youth (BMWFJ)
- Austrian Research Funding Association (FFG): budget from BMVIT and BMWFJ
- Austrian Science Fund (FWF): affiliated to BMWF; bottom-up principle

- Organisation: BMLFUW
- Contact person: **Elfriede Fuhrmann, Maria Keuschnigg**
- e-mail: elfriede.fuhrmann@lebensministerium.at; maria.keuschnigg@lebensministerium.at
- Website: www.lebensministerium.at

NATIONAL PROGRAMMES AND SUB-PROGRAMMES (P & sP)

Main National Programmes/Sub-programmes (P & sP) on research, development and innovation dealing with the area here addressed. If there are P & sP on knowledge transfer and diffusion of results please indicate them as well.

Number P & sP	Names of main P & sP	Estimated budget and funding allocated to sustainability/intensification of agriculture in these P & sP (last 3 years)	Main organisations involved on research		
			Universities	Public institutions	Industries, SMEs, NGOs, others.
<ul style="list-style-type: none"> P: 2 sP: 	<ul style="list-style-type: none"> P: PFEIL 15 – Programme for Research and Development of the Ministry of Life (previous programmes: PFEIL 05 & PFEIL 10) budget & administration: BMLFUW; ongoing programme P: COMET – Competence Centres for Excellent Technologies; budget: BMVIT and BMWFJ; administration: FFG; ongoing programme 	<ul style="list-style-type: none"> Budget PFEIL 15 (& 10) for contract research, and research funding in the range of agriculture, forestry, environment, water management in general: 11 mio €; Funding allocated to sustainable intensification: 5 mio € contract research & budget allocated to ministry related research institutions Budget for Competence Centre "Future Farm Technology" (FFT): 3.16 mio €; Funding: shared equally between public and private funders 	<ul style="list-style-type: none"> University of Natural Resources and Life Sciences (BOKU) Vienna University of Technology University of Veterinary Medicine, Vienna University of Innsbruck University of Vienna 	<ul style="list-style-type: none"> Agricultural Research and Education Centre Raumberg-Gumpenstein Austrian Agency for Health and Food Safety (AGES) Gregor Mendel Institute of Molecular Plant Biology (GMI) – founded by Austrian Academy of Sciences (ÖAW) Agricultural Research and Education Centre Francisco Josephinum – Josephinum Research Austrian Institute of Technology (AIT) Federal Institute of Agricultural Economics (AWI) 	<ul style="list-style-type: none"> Research Institute of Organic Agriculture (FiBL Austria) Bio Austria (agric. extension) ZuchtData EDV Dienstleistungen Salzburger Gleisdorf National breeders' associations (cattle, pigs, poultry) Arche Noah Biohelp Exemplary SMEs – IT & technology: CogVis (spin-off of Vienna University of Technology), Pass Instruments, Integrated Microsystems Austria, PROGIS Software, Maschinen Ring Austria

INTERNATIONAL COOPERATION

Projects		Number of projects / initiatives last 3 years	Average budget per project or initiative	Name and acronym (main ones)	Countries in consortium
EU level	FP7 projects	20	€ 400.000 (budget AT)	<ul style="list-style-type: none"> Strategies for organic and low-input integrated breeding and management (SOLIBAM) Innovative biological products for soil pest control (INBIOGOL) Robot fleets for highly effective crop management in Mediterranean agriculture (RHEA) Meeting the challenges of the farm of tomorrow by integrating Farm Management Information Systems to support real-time management decisions and compliance to standard (FutureFarm) Development of an automatic irrigation and fertilization system (OPTIFERT) 	<ul style="list-style-type: none"> FR, AT, IT, UK, DK, DE, PT, ES, HU, CH, NL, ET, HE (CARDIA) DE, AT, UK, DK, ES, CH, CZ, BE ES, FR, BE, DE, CH, AT, IT, GR GR, DK, DE, CZ, FI, IT, NL, AT, ES, UK DE, AT, UK, PL
	ERA-NETS	4		<ul style="list-style-type: none"> CORE ORGANIC BRACAPS EUPHRESICO ANIMWA 	<ul style="list-style-type: none"> DK, AT, DE, BE, CZ, EE, FI, FR, IE, IT, LT, LU, NL, NO, SI, ES, SE, CH, TR, UK, LV UK, AT, BE, DE, DK, EE, ES, FR, HU, IL, IT, LV, NL, NO, PL, PT, RS, CA, NZ UK, AT, BE, BG, CZ, DK, EE, FI, FR, DE, GR, IL, IT, LT, NL, NO, PL, PT, SI, SK, TR, UA, RU FR, AT, BE, CY, CZ, DK, FI, DE, GR, IE, IL, IT, LT, NL, NO, ES, SE, CH, UK
Other International Cooperation			<ul style="list-style-type: none"> Average COST action support per annum: € 129.000 Approx. € 8.000 membership fee & intangible services 	<ul style="list-style-type: none"> COST – FA1206: Pathogen-informed strategies for sustainable broad-spectrum crop resistance (starts in April 2013) COST – FA1105: Towards a sustainable and productive EU organic greenhouse horticulture COST – FA1206: Strigolactones: biological roles and applications (starts in April 2013) COST – FA1103: Endophytes in Biotechnology and Agriculture COST – FA9503: Harnessing plant reproduction for crop improvement COST – FA9506: Plant virus control employing RNA-based vaccines: A novel non-transgenic strategy European Cooperative Programme for Plant Genetic Resources (ECPGR) 	<ul style="list-style-type: none"> AT, BE, DK, FR, DE, HU, IL, MT, NL, NO, PL, PT, RO, ES, CH, UK NL, SE, AT, BE, CH, CY, DE, DK, EE, ES, FI, FR, IL, IS, IT, NO, PL, RO, SI, TR, UK AT, BE, HR, CZ, FR, DE, GR, IL, IT, NL, NO, PL, PT, RO, RS, SK, ES, SE, CH, UK DE, UK, AT, BE, BA, CZ, DK, FI, FR, GR, IE, IL, IT, NL, PL, PT, SK, SI, SK, ES, SE, CH, TR, UK IT, BE, AT, BG, CZ, DK, FR, DE, GR, HU, IE, IT, LV, NL, NO, PL, PT, RS, SK, ES, SE, CH, TR, UK GR, CH, AT, BE, BG, HR, CY, CZ, DK, EE, FI, FR, DE, HU, IL, IT, NL, NO, PL, PT, RO, RS, SK, SI, ES, SE, TR, UK (COST participants, excl. non-COST participants)



MAPPING OF CURRENT RESEARCH: Environmentally sustainable growth and intensification of agriculture

AUSTRIA



SECTORS	Total Projects (last 3 years)	Total Funding	AREAS	MAIN PROJECTS	Research Effort (Person Month)
 PLANT PRODUCTION (cropping systems)	24	8.26 mlo. €	Plant genetic resources (breeding / genetics / biodiversity)	<i>Strategies for organic and low-input integrated breeding and management; Variety trials for organic farming; Comparison and adaptation of open pollinating varieties of carrots</i>	34
			Land based innovative cropping systems	Reducing fuel consumption by 20%; Effects of different soil management systems on carbon sequestration; Reduced tillage and green manure	254
			Plant protection	<i>Innovative biological products for soil pest control; Genetic determination of susceptibility to ear fusariosis; Development of Erwinia bacterioides; Copper as plant protection product</i>	113
			Organic farming: low-input – high-efficiency crops	Optimizing the conditions for the production of grain legumes; Long-term monitoring of effects of conversion to organic farming	154
			Organic farming: agro-ecological technologies	Innovative cropping techniques to increase soil health in organic fruit tree crops; Monitoring of diseases on potatoes	64
			Agro-ecological technologies for plant production intensification	Impact of intensive and reduced fertilizing-regimes on site-specific leaching of nutrients in farming systems; Use of beneficials	56
			Remote sensing	---	
			Production in greenhouses	---	
 ANIMAL PRODUCTION (incl. grassland)	34	8.29 mlo. €	Farm animal genetic resources (breeding / genetics / biodiversity)	Genomic selection across cattle breeds; Optimization of long-term genetic progress of Austrian cattle breeds; Development of genetic evaluations for health traits; Genetic analysis of lifetime production of sows	179
			Land-less management systems	Layer hens kept in alternative husbandry systems; Alternative fish feed	105
			Agro-ecological technologies on farm intensification – Animal production	<i>Sustainable organic and low-input dairying; Strategies to reduce the concentrate input in organic dairy production; Feed intake, milk performance of dairy goats</i>	48
			Agro-ecological technologies on farm intensification – Grassland	Nutrient flux, forage yields and biodiversity under different grassland management; Phosphorus dynamic in grassland soils; Leaf fertilization on meadows; Improvement of slurry fertilization	133
			Organic farming: Animal welfare	Strategies to reduce environmental impact by improving health and welfare; Monitoring of health and welfare plans in Austrian organic pig farms; Prevention of diseases and parasites in organic pig herds; Minimizing medicine use in organic dairy herds	150
			Organic farming: Resource use efficiency	Optimization of the protein supply of dairy cows fed forage-based diets; Alternative protein sources for rearing piglets; Improved contribution of local feed to support 100% organic feed supply to pigs and poultry	66
 HORIZONTAL ASPECTS	12	5.07 mlo. €	Sustainability of agricultural production	Integrative evaluation of ecological, economic and social sustainability aspects in dairy production; Life cycle assessment of Austrian farms	128
			Sustainable management	<i>Integrating farm management information systems; Automatic irrigation and fertilization system; Robot fleets for highly effective crop management in Mediterranean agriculture; Future farm technology</i>	---
			Socio-economic aspects	Phasing-out of milk-quotas; Market risk management options for Austrian farms	15
			Diversification of production systems	Compilation of information regarding underutilized species and varieties	7

Projects in *italics* are FP7-Projects, for which we have no information about person-months

ANNEX 2. THE BREAK-OUT SESSIONS DURING MAPPING MEETINGS

Break-out sessions consisted in dividing participants into small working groups in order to analyse the content of national posters. Through the facilitation of moderators, this joint analysis led to:

- the identification of research gaps, overlaps, complementarities and emerging topics;
- the mapping of research facilities;
- and the drafting of recommendations on research topics for joint actions and associated tools which could be implemented.

Each working group combined four to five countries and was composed of research and policy delegates. As mapping meetings lasted two days, the composition of working groups was modified the second day in order to promote a wider analysis and a stronger consensus among participants. Results were collected in a pre-defined template for each working group.

An example of outcome resulting from a break-out session during the third Mapping Meeting is given in Table 1 (Core Theme 3 “Assessing and reducing trade-offs: food production; biodiversity and ecosystem services”).

Table 1. Outcomes of a break-out session of FACCE JPI’s third Mapping Meeting

GROUP 1 - To identify				
Gaps	Overlaps - Complementarities	Synergies	Emerging research topics	Research facilities
Genetic resources & old races with less impact on ecosystem services (ESS). Full chain view: productivity – trade offs (projects generally view a limited scope). General understanding of interactions between farming & ESS + ESS valuation.	Animal welfare. Biodiversity issues in Grasslands and Forestry. Conservation of genetic variation in plants.	ERA-NETs (several). Future crop pests.	Biological soil nutrient extraction (e.g. <i>Mycorrhiza</i> uptake of P). Soil carbon sequestration and Long term soil fertility. Closed cycle concepts in farming – farm and societal scale (industrial symbioses).	No common gene-bank and conservatories. No common or general experimental approach & facilities. No data sharing.
Recommendations				
Research topics for joint actions		Tools to undertake cooperation	Other suggestions	
“Closed cycle concepts” thinking and research in food production (from flow to cycle). Long term soil carbon storage and soil fertility conservation.		Transfer recommendations to EU level (e.g. calls in Horizon 2020). Common and coordinated research approaches and experimental infrastructures. Common data and modelling platforms.		

Source: Third FACCE-JPI Mapping Meeting Report (July 2012)

The main outcomes of the five Mapping meetings are summarized below in Table 2. They provided recommendations concerning research themes and tools identified for joint actions and cooperative research. In addition, the summarizing process of all five Mapping Meetings led to the identification of cross-cutting themes: (i) regionalisation, (ii) scale, (iii) food chain approach, (iv) socio-economic and cultural aspects and (v) implementation of new technologies.¹¹⁰

¹¹⁰ Synthesis of Mapping Meeting 1 – 5 (June 2013)

Table 2. Main outcomes of the Mapping Meetings

<i>FACCE Core Theme</i>	<i>Research themes identified</i>	<i>Tools and joint actions suggested</i>
MM1: Greenhouse gas mitigation	<ul style="list-style-type: none"> • Carbon sequestration in crop production • Protocols and certification for methods to assess greenhouse gas emission • Reduction of emissions by livestock • Carbon and nitrogen cycling in the agro-ecosystems • Study of indirect emissions 	<ul style="list-style-type: none"> • Harmonization of modelling efforts • Cooperation with other initiatives • Identification of infrastructures to be shared • Development of tools for judging integrated production systems
MM2: Climate change adaptation	<ul style="list-style-type: none"> • Risks for and adaptation of livestock systems, crop production and forestry • Policies and incentives for sustainable production, transformation and consumption • Water management in agricultural production • Risk assessment of extreme climatic events 	<ul style="list-style-type: none"> • Transnational programmes • Cooperation and sharing (data, infrastructures, methodologies, trainings, mobility) • Regionalisation • Support regulation on adaptation
MM3: Assessing and reducing trade-offs: food production; biodiversity and ecosystem services	<ul style="list-style-type: none"> • Definition and valuation methods of ecosystem services • Assessment of ecosystem services • Interlinking between science and policy • Land sharing versus land sparing 	<ul style="list-style-type: none"> • Networking for data collection and sharing, pooling of expertise • Targeted projects • Trainings • Collaboration with other initiatives
MM4: Sustainable food security under climate change	<ul style="list-style-type: none"> • Study of food chains • Scenario building and modelling • Assessment and influence of consumer behaviour • Land use changes under climate change • Impact assessments of policy instruments • Quantifying and diminishing food waste 	<ul style="list-style-type: none"> • Sharing of financial and scientific resources • Think tank to promote joint actions • Coordination with other UE and international initiatives • Interaction with end-users
MM5: Environmentally sustainable growth and intensification of agriculture	<ul style="list-style-type: none"> • Systemic approach (socio-economic aspects, farm and landscape levels) • Diversification of production • Innovations in plant and animal breeding • Data availability and mutual learning 	<ul style="list-style-type: none"> • Inter-regional networks involving researchers and stakeholders • Joint experimental farming • Open access to genetic resources • Collaborations with other initiatives

Source: Mapping Meeting Reports

ANNEX 3. THE BROAD-BASED CONCLUDING MEETING¹¹¹

The Broad-Based Concluding Meeting took place in June 2013 after the publication of FACCE-JPI's Strategic Research Agenda, in order to provide inputs for the First Biennial Implementation Plan (2014-2015). Two sessions were key to the effective progress of the meeting:

1) 'World Café' discussion session:

After an introduction presenting the state of the art concerning the Implementation Plan as well as the key outcomes of the five Mapping meetings, seven discussion tables were organised:

- Four of them addressed the crosscutting issues identified in the previous mapping meetings (regional aspects, scale and chain, end-users, open data access and standardization), each table dealing with one specific crosscutting issue.
- The three other discussion tables focused each on one of the three categories elaborated for the Implementation Matrix: (1) mature research areas with associated alignment instruments, (2) emerging research subjects requiring the implementation of scoping instruments and (3) areas where there is a need for common European efforts and developing research, which can benefit from the use of funding instruments for collaborative projects, ERA-NETs and joint infrastructures. They enabled the completion of the Implementation Matrix per Core Theme (see below for the example of Core Theme 2 "*Environmentally sustainable growth and intensification of agriculture*"). Common understanding of each research topic was achieved, leading to additional suggestions regarding possible tools to be jointly implemented.

2) 'Stickers session':

A voting system was put in place in order for participants to indicate the support of their country or research organisation to identified research topics in the Implementation Matrix. Three groups were formed:

- The "Policy" groups brought together national representatives of the 19 countries participating in the Broad-Based Concluding Meeting; hence, 19 "Policy" sub-groups could vote.
- The "Science" group was divided in four sub-groups: animal, plant, land use and socio-economic sectors.
- The "Stakeholders" group was divided in three sub-groups: farmers, industry and consumers.

Each sub-group was given one set of votes: a sub-group could vote for three different alignment topics (Category 1), four different emerging topics (Category 2) and 7 different new funding topics (Category 3). A desk study was conducted with the voting results in order to analyse the main research priorities of participants.

¹¹¹ Report of FACCE-JPI Mapping and Foresight – Broad-Based Concluding Meeting (June 2013)

<p>Core theme 2 Environmentally sustainable growth and intensification of agricultural systems</p>	<p>Cat 1. Mature Research ⇒ Alignment instruments</p> <p>including areas where research is scattered ⇒ alignment at geographic or thematic level</p> <p>2.1.1 Agricultural soil restoration Knowledge Hub. Developing novel methods for restoring organic matter in agricultural soils, reduce erosion and increase soil quality by reducing organic pollutants and heavy metals (e.g. by increasing soil biological activity, through conservation agriculture, crop and grassland rotations, mulch and composts, buffer strips, phytoremediation, etc.). Collaboration with JRC and with FAO, with Snowman network. (2014) <i>Of interest to Plant ETP, support of IPWG, TP O</i></p> <p>2.1.2 Sustainable intensification of major European crop and livestock systems Combined development of breeding (and multiplication of locally adapted seeds and breeds), plant/animal health, agro-ecological engineering, precision farming, ecotechnologies and biotechnologies for increased environmental sustainability, increased feed efficiency, resource efficiency & conservation, productivity and competitiveness in the context of climate change (Link to agricultural EIP: Coordinate efforts across countries with support through long-term funding of > 4 years. Knowledge networks, possibly combined later within a single knowledge hub) Research should not only target major crops, but also minor crops to favour crop diversification opportunities. (2015) <i>Priority: Plant ETP, Support of IPWG</i></p> <p>Collaboration with EIP (not funded by FACCE) Research and Innovation Board on environmentally sustainable growth and intensification of agricultural systems. This would be an ongoing discussion and dissemination activity looking at major projects funded at European or Member States levels, to discuss the additional steps needed until it can actually be implemented at the farm level. It could be run by the relevant ETPs to identify, if towards the end of the projects, further basic research or applied research or knowledge transfer or which measures in the innovation framework would be needed to make sure that all projects lead to their implementation at farm level. (2014)</p> <p>Collaboration with EIP (not funded by FACCE) Facilitating extension services across Europe to bring the knowledge to the farmers and to give feedbacks from the farmers to the researchers. The implementation would be mainly via the CAP but the link up at the European level should be done via the Horizon programme. For the European component, relevant ETPs could take the lead. (2015)</p>	<p>Cat 3. Need common European effort and developing research ⇒ Funding instruments, Collaborative projects</p> <p>2.3.6 Bioeconomy socio-economics. New analytical and transectorial models across value chains including tools for spatial disaggregation and consumer values. Barriers to implementation. Opportunities for job creation, SMEs...</p> <p>2.3.7 Benchmarking yield gaps, production and quality losses across Europe in terms of Genotype x Environment x Management interactions and of resource (water, nutrients) efficiencies (address interactions with climate change, cropping systems and socio-economic barriers). This could start with a single crop (e.g. wheat which displays stagnating yields), but could also be address more crops. <i>Priority: Plant ETP</i></p> <p>2.3.8 Breeding for disease resistant crop genotypes adapted to local conditions and deploying resistance genes in landscapes and European regions to maximize their efficiency and their lifespan. Special attention will be paid to emerging plant diseases in the context of climate change. Link with multi-sector project under EIP, e.g. for on-farm-bred varieties <i>Priority: IPWG, Plant ETP</i></p> <p>2.3.9 Developing novel vaccination methods and breeding for robustness (to infectious diseases) in livestock and aquaculture species. See also 2.12. Special attention will be paid to emerging animal diseases in the context of climate change.</p> <p>2.3.10 Developing integrated crop- livestock-renewable energy systems, including aquaculture production as well as the recycling of animal wastes (e.g. through algae), of green wastes and the provision of renewable energy generation (e.g. biogas, heat) and assessing their sustainability and competitiveness. This also includes assessing the (geographical) scale and local systems organisation, and new business models for different regions. (Link with COFASP ERA-Net)</p> <p>2.3.11 Efficiency animal feed chains. Create new opportunities to improve the efficiency of feed chains by optimising the quantity of feed available for the animal, reducing losses, better use of local resources and creating new feed chains of alternative feed resources and by-products of the food chain, thereby reducing waste.</p> <p>2.3.12 Epidemiological monitoring (e.g. early warning systems, on farm detection/diagnostic tools) for early detection, control and eradication of animal and plant diseases/emerging risks. This includes image analysis, and geolocalization technologies (see also 4.1.2 which is more on adaptation)</p> <p>2.3.13 New instruments and new sensors for agricultural productivity and food quality (e.g. agricultural engineering, horticulture, plant and animal phenotyping under climate change, food processing) and for environmental quality (e.g. water, soil and air quality in agricultural landscapes). <i>Priority: IPWG, Plant ETP</i></p> <p>2.3.14 Food safety risks, food traceability and environmental quality in the bioeconomy: integrated studies of emerging risks from biotic and abiotic agents in agricultural/bioeconomy systems especially those recycling organic wastes and waste waters. Reducing potentially harmful molecules in food supply chains, such as microbial pathogens, heavy metals, mycotoxins, biogenic amines, neurotoxins and other organic compounds, as well as the persistent contaminants (dioxins, PCBs, PFOs and PFOA, PBDE, etc). The corresponding risks will be assessed in the context of climate change.</p> <p>2.3.15 Nitrogen and phosphorus losses to the aquatic environment. Development of new approaches (measurements, modeling, data integration) to assess new systems at field, farm, landscape and catchments scales for reducing nutrient loadings to surface waters (streams, lakes, marine environments) that cope with the changes in loss pathways and nutrient transformation processes as affect by climate change and climatic extremes.</p> <p>2.3.16 Agricultural systems for production near metropolises (local food production), in particular horticulture to supply citizens with vegetables.</p>	<p>Cat 3. Need common European effort and developing research ⇒ Funding instruments, ERA-NETs</p> <p>2.3.1 EXISTING Core-Organic III, Organic Agriculture ERA-NET. Reducing the environmental effects of organic agriculture throughout the value chain and also Functional biodiversity to improve management of pests and diseases and Plant/Soil Interaction. FACCE – JPI and CO will exchange on it might be possible to have a joint call. (Link through to CT4 and CT5)</p> <p>2.3.2 EXISTING Precision agriculture and ICT ERA-NET. Targeted collaboration on crop diversification, crop mixtures, multi-component agriculture, and adaptation of inputs to climatic variability and to GHG mitigation goals.</p> <p>2.3.3 EXISTING IPM, Integrated Pest Management ERA-NET. Targeted collaboration on emerging pests and diseases and on climate change adaptation of IPM strategies. (Link through to CT4)</p> <p>2.3.4 EXISTING ERA-CAPS, Advanced plant sciences. Targeted collaboration on drought, heat and salt tolerance of crop and pasture species, on root symbioses and on primary productivity adaptation to elevated CO₂. (Link through to CT4)</p> <p>2.3.5 NEW ERA-NET: Sustainable bioeconomy supply chains. Integrated approaches to overcome current barriers in bioeconomy supply chains and sustainably produce bioenergy and biomaterials while maintaining food production and increasing soil/biomass carbon stocks through the development of innovative knowledge intensive farming systems and land management at landscape to regional scales. Such systems combine food, feed, bioenergy and biobased products, recycling organic wastes, residues from agricultural production and producing and processing bioresources for industries. Special attention will be paid to GHG mitigation vs. fossil fuel substitution, to indirect land use change impacts and to climate change adaptation.</p>
			<p>Cat 3. Need common European effort and developing research ⇒ Funding instruments, Infrastructures</p> <p>2.3.17 NEW Infrastructure (I3). Conservation and use of plant genetic resources (including wild plant relatives). Access to genetic resources and (meta)data. Link through to CT4, preserving the genetic potential for adaptation. <i>Priority: Plant ETP</i></p> <p>2.3.18 NEW Infrastructure (I3). Conservation and use of animal genetic resources also to enlarge the basis of adaptation to climate change. Access to genetic resources and to (meta)data. Link through to CT4, preserving the genetic potential for adaptation.</p> <p>2.3.19 NEW Infrastructure. Monitoring water availability and quality for agriculture at river basin level (link through to CT4 adaptation). Such an infrastructure would have a high added value at EU scale to monitor changes in water resources as affected by climate change and by agriculture. Decision support tools for farmers in catchment areas will be developed. See also Water JPI, no overlap with ANAEE</p>
			<p>Cat 2. Emerging subjects ⇒ Scoping instruments (dialog with stakeholders, inputs to Cat 3)</p> <p>2.2.1 Increasing the interactions between environmental sciences, ecology, social sciences and the agricultural science community through joint FACCE JPI sessions/workshops (e.g. of European scientific societies). (2014) <i>Priority: Plant ETP, Important Copa-Cogeca</i></p> <p>2.2.2 How to create synergies and overcome barriers to crop diversification? Markets, breeding, machinery investments, behavioural attitudes of farmers, farm advisors, environmental organisations, researchers, government agencies and industries. (Link to 2.1.2) (2015) <i>Of interest to Plant ETP</i></p>

ANNEX 4. OUTCOMES OF THE MAPPING MEETINGS DISSEMINATION WORKSHOP¹¹²

The Mapping Meetings Dissemination Workshop was the closing act of the mapping activities that FACCE JPI undertook between 2011 and 2014. The objective of this workshop was to gather the specialists involved in mapping and foresight exercises of other JPIs, with the aim to exchange best practices and share FACCE's fruitful experience with the "mapping meetings" approach. Also, an online survey was carried out right after the event.

The main outcomes of the discussions maintained during the event and of the survey done afterwards can be summarized as follows:

- Mapping and foresight activities are a **cornerstone** for the elaboration of SRAs, implementation plans and identification of joint calls. However it must be kept in mind that mapping is not a goal in itself, but an instrument to identify actions to be undertaken.
- Regarding **methodology**, most JPIs have used questionnaires, interviews and desk researches (including bibliometric analysis) in their studies. On the contrary FACCE's Mapping Meetings should be considered as a unique exercise with an innovative approach, which a large majority of the participants (80%) have considered to be a useful or very useful instrument suitable to be applied in other of JPIs. In addition a number of other methodologies, to get some added value by going beyond classical surveys, were mentioned: i) questionnaires, followed by an interview, for precise topics; ii) literature studies commissioned to groups of experts; iii) to combine mapping meetings with quantitative research studies and iv) mappings at national level.
- About the **participants** in a mapping exercise, there is a consensus on the implication of scientific, policy and funding experts. It was also considered advisable the participation of industry/private stakeholders and pre-selected panels of experts.
- Regarding **when to map** the beginning of a JPI procedure seems to be the most suitable moment, to set a rationale for decisions. However since data gets outdated quite fast, mapping should be considered as a continuous process to be renewed frequently or on need basis (to update the SRA and/or implementation).
- **Challenges** for mapping activities developed by JPIs are: to find efficient and effective mechanisms to gather information; to go beyond the European level to a global perspective; to elaborate common, or at least intercomparable, frameworks for mapping at national level; and to improve and reinforce the procedures to go from mapping to new actions in the framework of the Strategic Research Agendas.
- Meetings with a similar approach as developed for mapping can be used in **evaluation and monitoring** of JPIs and their actions, along with other instruments, as it is a complex exercise that requires a new methodology.

In conclusion, this dissemination workshop inspired the JPIs on why and how to do mapping and foresight. The mapping meetings were considered by the other JPIs as a very good practice and approach that may also be suitable in their initiatives.

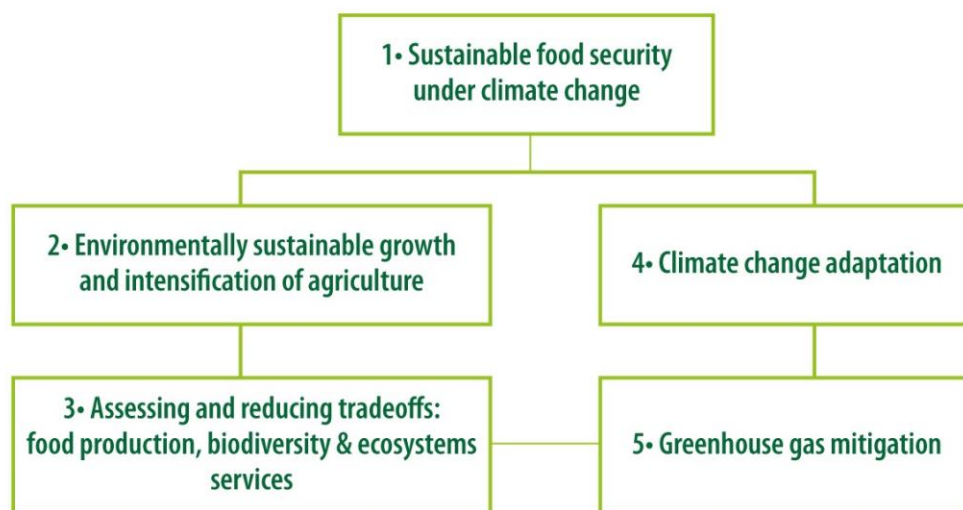
¹¹² Report of FACCE-JPI Mapping and Foresight dissemination activity – Mapping Meetings – Dissemination Workshop (2014)

ANNEX 5. JOINT PROGRAMMING INITIATIVE ON AGRICULTURE, FOOD SECURITY AND CLIMATE CHANGE¹¹³

The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) was among the first JPIs to be launched by the European Council (October 2010). This initiative brings together **22 countries** that are committed to building an **integrated European Research Area** addressing the challenges of agriculture, food security and climate change. Through their representatives on the FACCE-JPI Governing Board, these countries have agreed on a **common vision** to address these major societal challenges. **The JPI is providing coordination** between the member countries in their programming of research to achieve the FACCE-JPI vision (see below).

To achieve this goal, a strong **interdisciplinary research** base, encompassing economic and social aspects in addition to scientific ones, is required. This implies the need for a creative approach towards **aligning national programmes**. The interrelated challenges addressed are European and global and require the effort of multiple actors and stakeholders at regional, national and European levels. Input is provided by policy makers, the scientific community as well as stakeholders. The latter provides the JPI with advice through their representatives in the **Stakeholder Advisory Board**.

To respond to the interconnected challenges of sustainable agriculture, food security and impacts of climate change, the **Strategic Research Agenda** of FACCE-JPI includes five evidence-based interdisciplinary Core research Themes (CT) proposed by the Scientific Advisory Board:



This Strategic Research Agenda has been designed to set out clear **policy-relevant research priorities** on agriculture, food security and climate change in Europe, and to list the strategic actions involved to achieve these goals and align current and future national research programmes.

FACCE-JPI seeks to mobilize the research community across Europe to work together to meet the grand societal challenges by:

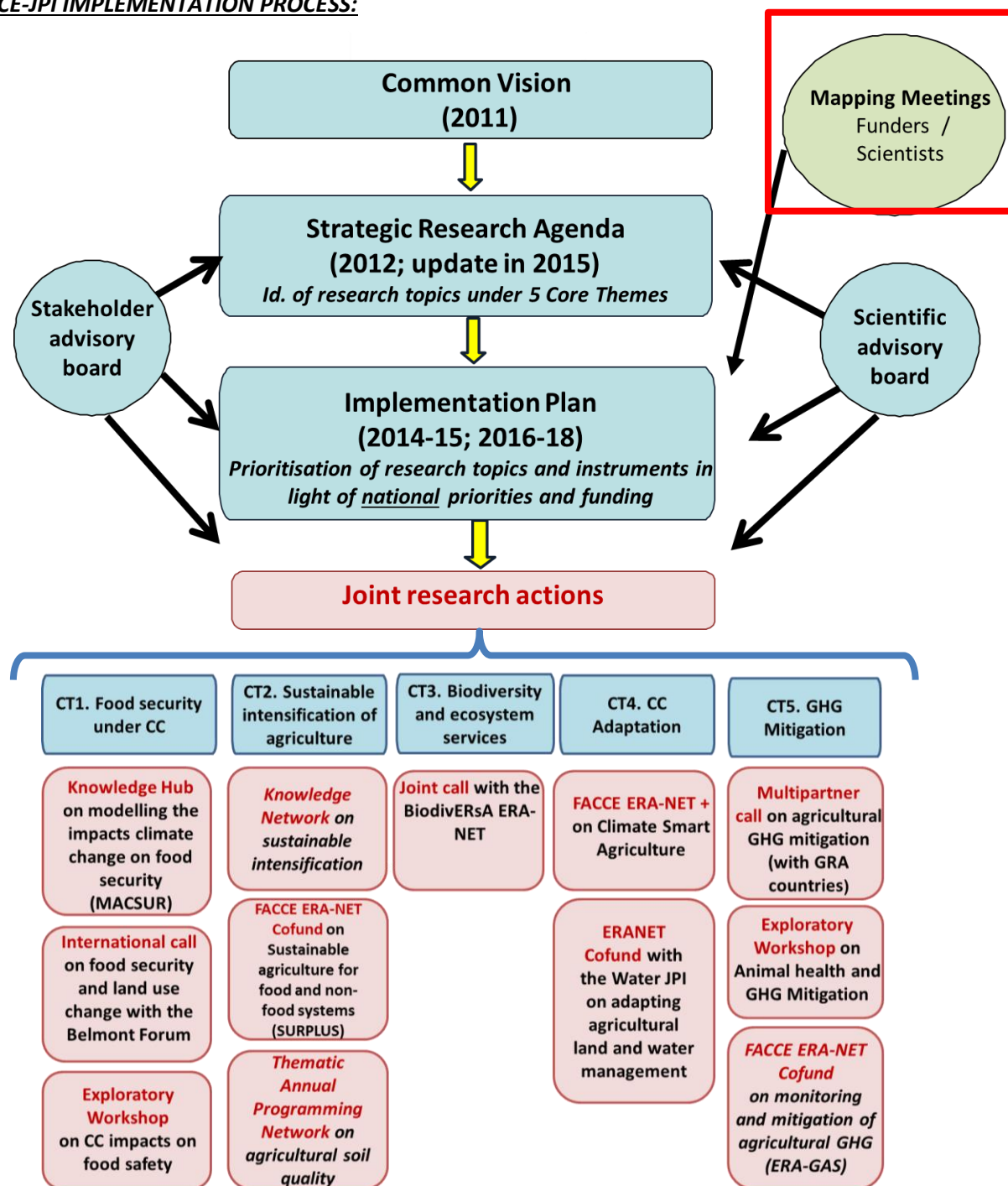
- **Improving the alignment of national and European research programmes,**
- **Increasing high quality transnational research activities within food security, agriculture and climate change, and**
- **Improving European research' societal impact on the challenge of food security, agriculture and climate change.**

FACCE-JPI VISION: *An integrated European Research Area addressing the challenges of Agriculture, Food Security and Climate Change to achieve sustainable growth in agricultural production to meet increasing world food demand and contributing to sustainable economic growth and a European bio-based economy while maintaining and restoring ecosystem services under current and future climate change.*

¹¹³ FACCE-JPI Strategic Research Agenda (2016)

FACCE-JPI MISSION: to achieve, support and promote integration, alignment and joint implementation of national resources in Europe under a common research strategy to address the diverse challenges in agriculture, food security and climate change.

FACCE-JPI IMPLEMENTATION PROCESS:



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170



Case Study No.7- The Open Access Infrastructure for Research in Europe (OpenAIRE)

Due date of deliverable: April 2016

Actual submission date: November 2016

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that supports greater alignment of research activities across countries, namely **the Open Access Infrastructure for Research in Europe (OpenAIRE)**. This support platform promotes open access to research outputs across 33 countries from Europe and beyond, hence contributing to alignment mainly at an operational level. It provides a technical infrastructure that includes an online platform and associated services in order to centralise, harmonise, disseminate and interlink open research data. OpenAIRE also facilitates the coordination of national and transnational Open Access (OA) activities through a network of national experts in order to promote open access and spread related best practices. The case study provides **recommendations on key factors of success for public-to-public research networks (P2Ps) wishing to use such an instrument and to enhance open access to research data, publications and related project information**, in view of promoting alignment. It does however not aim to provide an in-depth assessment of OpenAIRE.

The study highlights OpenAIRE's many benefits. This initiative has facilitated the **promotion of Open Access to research data at policy and operational levels** across Europe, involving all key transnational, national and local players (i.e. European Commission, governments, data providers, research institutes, research communities). In particular, the active OpenAIRE network of experts has supported the **development and alignment of national OA policies, best practices and infrastructures** across participating countries. This has in turn allowed to improve the **standardisation and interoperability of research outputs**, especially by fostering alignment amongst data providers at operational level. As such, OpenAIRE has contributed to enhancing access to and visibility and re-use of existing research data. For instance, the online open access platform supports higher **uptake by end-users**, hence increasing the potential for return on investment. Similarly, it enhances **transparency and awareness of past and current research activities and related outcomes both at researchers' and policy levels**, which contributes to avoiding unnecessary duplication of research efforts and supporting efficient progress of research. In particular, the overall cross-linking and analysis of research outputs in various research areas can feed into future research policies and funding strategies at national and transnational levels.

Yet, OpenAIRE has also been confronted with: (i) several limitations regarding the voluntary approach towards Open Access development, including variations in partners' involvement and uptake of common OA guidelines, as well as low financial commitment of partners; (ii) the difficulty in bringing together and effectively supporting all key players and initiatives involved in Open Access issues at international, national and local levels; and (iii) the challenge to adapt to research and technological landscapes that constantly evolve according to emerging research needs and opportunities as well as technical advancements related to Open Access.

The case study builds on the ERA-LEARN 2020 Task 4.1 ("Definition and Typology of Alignment"), and relies on a review of existing literature and targeted exchanges with the Project Manager of OpenAIRE. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 "Assessment of Current Approaches to Alignment". The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.). The focus of the following case study (i.e. Open Access) can also be considered as part of the Framework Conditions of Joint Programming, several of which are also analysed in the ERA-LEARN 2020 Task 2.2 ("Support for implementation of Framework Conditions for the JPI community").

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to Natalia Manola (OpenAIRE Project Manager, University of Athens) for her valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that fosters alignment, namely the **Open Access Infrastructure for Research in Europe (OpenAIRE)**. The study assesses how such a tool has been used for promoting greater alignment of national research outputs and activities. It also provides **recommendations on key factors of success for public-to-public research networks (P2Ps)** wishing to use such an instrument and to enhance open access to research data, publications and related project information, in view of promoting alignment.

According to the Typology of Alignment, open access to national (and transnational) research data and outputs allows their re-use by other researchers across countries and fosters their interoperability. Virtual infrastructures that allow research data sharing greatly contribute to operational alignment. Their operation relies on the engagement of all stakeholders that are involved in research data production, management, preservation, publication and policy-making: i.e. researchers, project coordinators and managers, research institutions, data providers and academic publishers, research administrators and research funding providers.

2. Key features of OpenAIRE

2.1 Overview

The Open Access Infrastructure for Research in Europe (OpenAIRE) is a support platform for open scholarly communication. It was initially established in 2009 in order to facilitate the implementation of the Green Open Access Pilot¹¹⁴ launched by the European Commission under the topic “Infrastructures” of its 7th Framework Programme. The initiative now involves partners from 33 countries across the EU and beyond¹¹⁵. It supports a coordination platform (i.e. network of national experts) in order to promote open access and spread related best practices across Europe and beyond, as well as a technical infrastructure (i.e. through an online platform¹¹⁶ and associated services) in order to centralise, harmonise, disseminate and interlink open research data.

Open Access is defined as immediate, online, free availability of research outputs. It enhances the latter's visibility, dissemination, re-use and impact. As such, Open Access promotes efficient progress of research through transnational and transdisciplinary research collaboration and through knowledge exchange amongst academics. It also fosters knowledge transfer towards policy-makers, end-users and society at large, maximising the return on investment of publicly funded research activities. There are two ways of achieving Open Access:

- “Gold” Open Access: this refers to open access publishing, which means that the costs related to the publication of an article are not covered by readers but by institutional or project funding associated to the authors, by institutional libraries or by other sources. This ensures the immediate availability of publications.
- “Green” Open Access: this refers to self-archiving, which means that authors deposit the peer-reviewed manuscripts of their articles in repositories. This can require an embargo period in order for the publisher to recoup their investment.¹¹⁷

The European Commission's desire to effectively disseminate the outputs of its funded research projects has been supported by the implementation of several Open Access Pilots (i.e. FP7 Green Open Access Pilot, FP7 post-grant Open Access publishing funds pilot¹¹⁸, H2020 Open Research Data Pilot¹¹⁹). OpenAIRE has been supporting these EC pilots and has also established links with international Open Access initiatives such as the Confederation of Open Access Repositories (COAR)¹²⁰.

¹¹⁴ <http://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=pilot>

¹¹⁵ OpenAIRE partners include all 28 EU Member-States and five Associate and other countries (Switzerland, Norway, Iceland, Turkey and Serbia).

¹¹⁶ <https://www.openaire.eu/>

¹¹⁷ Open Access Pilot in FP7 (Leaflet)

¹¹⁸ <https://www.openaire.eu/postgrantoapilot>

¹¹⁹ <https://www.openaire.eu/opendatapilot>

¹²⁰ <https://www.coar-repositories.org/>

2.2 Mission and activities

OpenAIRE seeks to provide technical and coordination support in order to promote Open Access (OA) to research publications and other related outputs (e.g. datasets, software, services), enhance their uptake by end-users and policy-makers in decision-making processes and facilitate their efficient integration in future research strategies. In particular, this OA initiative aims to provide the overall management, analysis, manipulation, provision, monitoring and cross-linking of all research outputs across existing, planned and future repositories.

OpenAIRE's activities are carried out by a group of various experts in open access and open science, library information, information and computer science, law and research data. The initiative's current targeted objectives¹²¹ are to:

- Support the H2020 vision of open access for scientific publications and the Open Data Pilot for H2020¹²² by making OpenAIRE a central infrastructure and service in H2020;
- Build a pan-European Research Information platform to monitor OA research outputs from the EC and other funders (at national, regional and disciplinary levels) and foster the collaboration of OA repositories;
- Develop research analytics tools to promote new research metrics and support evidence-based decision-making;
- Make OpenAIRE a hub for third party providers to build innovative services that explore new forms of scholarly communication and promote alternative, competitive Open Access publishing models.¹²³

OpenAIRE's work aims to benefit (i) individual researchers that are required to or wish to set-up open access to their research outputs; (ii) administrators of research institutions that are required to comply with EC Open Access policies or that seek to monitor their institution's open research outputs; (iii) research data providers, including scholarly literature and data repositories and CRIS systems (current research information systems), that are required to comply with EC Open Access policies or that wish to enhance open access and cross-linking of research outputs; and (iv) research funding providers and policy makers that wish to establish and monitor Open Access policies (especially in line with those of the EC) or that seek information on research trends in order to design relevant research funding strategies.

2.3 Governance structure

The OpenAIRE consortium is currently undertaking specific activities in view of establishing a legal entity and a related governance model by the spring of 2017. In particular, OpenAIRE's governance structure should allow its members to operate at the OA policy advice and implementation level as well as at the service provision level.

- Regarding policy making, OA policies are required both at the level of research performing organisations and ministries, which is why the latter should be involved in decision-making processes and actively participate in the implementation of OA policies at their respective level once these have been elaborated.
- Concerning the provision of OA services, the established governance model should also include the research performing organisations that provide core services (e.g. repository) in the decision-making processes.
- Similarly, concerning the reception of OA services, the research performing organisations that receive these services should be able to provide feedback and belong to a second-tier of membership. However, they may not necessarily be included in the decision-making processes.

In short, OpenAIRE's revised governance model should rely on a "mirrored" approach. Those elaborating and implementing OA services and policies should be part of the decision-making body, while those receiving services or applying elaborated policies should have an advisory role.

¹²¹ Objectives defined under the current H2020 funded project OpenAIRE2020.

¹²² As of 2017, research data related to H2020 funding will be open by default:

https://ec.europa.eu/research/press/2016/pdf/opendata-infographic_072016.pdf.

¹²³ OpenAIRE2020 Factsheet

2.4 Approximate resources and time needed for implementation

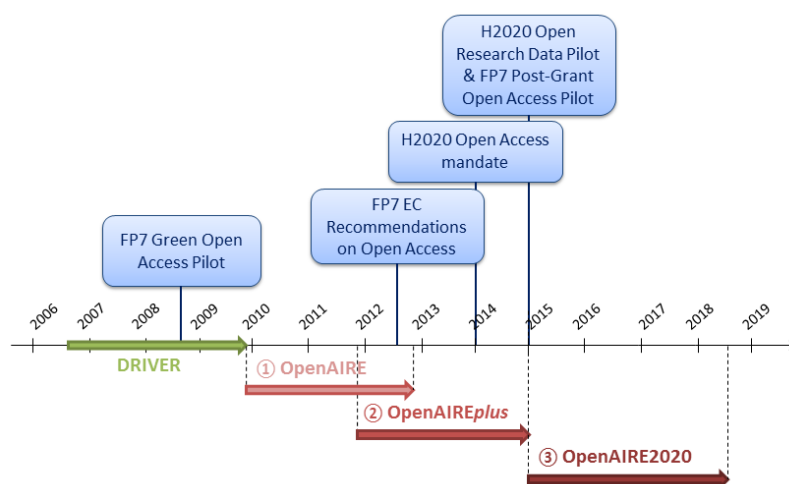
OpenAIRE was launched in 2009 as a project largely funded by the EC's 7th Research and Innovation Framework Programme (i.e. OpenAIRE followed by OpenAIRE_{plus}) and is now operating under Horizon 2020 (OpenAIRE2020). The OpenAIRE project's budget has significantly increased, indicating a growing interest for Open Access across Europe. Indeed, it amounted to 5 M€ for the first FP7 project (with an EC contribution of 4.2 M€ and in-kind contributions from partners) and to 5.1 M€ for the second FP7 project (with an EC contribution of 4.2 M€), while it amounts to 13 M€ for the H2020 project¹²⁴, entirely funded by the EC.

One of OpenAIRE's key aims from its onset was the establishment, coordination and operation of a network of national experts across its 33 partner countries, the National Open Access Desks (NOADs). This network has greatly supported the implementation and development of OpenAIRE activities over time (see Sections 3 and 4.1 below). About half of OpenAIRE's budget is spent on the coordination of the network and the latter's local operations. It is essentially delivered as a subsidy to national resources, as selected NOADs are organisations that serve Open Access purposes within their national jurisdiction.

As illustrated in Figure 1 below, OpenAIRE is the successor of the DRIVER project (Digital Repository Infrastructure Vision for European Research)¹²⁵. The latter initiated a pan-European collaborative infrastructure of Digital Repositories in order to promote free online access to scientific publications and other outputs and developed related software services that served as an initial basis for the elaboration of OpenAIRE's technical infrastructure.¹²⁶

Moreover, OpenAIRE activities have strongly supported and been influenced by the evolution of European policies regarding Open Access. In particular, after the publication of the EC's Recommendations on access to and preservation of scientific information in August 2008, OpenAIRE became an essential platform within the EC's Framework Programmes in order to **support the implementation and alignment of Open Access policies** at national level. Under Horizon 2020, open access to publications related to EC funded projects has become mandatory. In addition, two EC pilots have been implemented under the OpenAIRE project, one providing the funding for OA publications for finalized FP7 projects (i.e. FP7 Post-Grant Open Access Pilot) and the other enhancing the access to any type of research data (i.e. Open Research Data Pilot).

Figure 1. Timeline for implementation



Source: Own compilation

¹²⁴ This EC budget includes 4M€ that are delivered by OpenAIRE to publishers for Author Processing Charges as part of the FP7 Post-Grant Gold Open Access Pilot.

¹²⁵ http://cordis.europa.eu/project/rcn/86426_en.html

¹²⁶ OpenAIRE Factsheet

3. Principal outputs to date

OpenAIRE has greatly contributed to promoting Open Access across Europe and hence strengthening the European Research Area. So far, the initiative has supported:

- The expansion of OpenAIRE's membership from 38 partners from 27 European countries in 2009 to 50 partners from 33 countries across the EU and beyond, hence supporting the development of Open Access in Europe and worldwide;
- The set-up and strengthening of a network of National Open Access Desks (NOADS) in all member countries (formerly called National Open Access Liaison Offices), which provide support for OA compliance and for the development and alignment of OA policies and infrastructures (see examples in Annex 1);
- The development of an online portal which (i) provides a gateway for deposit and dissemination of OA research data to Europe's decentralised repository network, amounting to over 17.400.000 publications and 28.000 datasets from more than 700 validated data sources up to now (i.e. repositories, journals, aggregators, databases)¹²⁷, approximately covering 60% of the entire European repository landscape; (ii) facilitates the dissemination of learning material on OA such as guidelines, factsheets, studies and online trainings; and (iii) gives access to country information on the research and open access landscape.
- The set-up of a technical infrastructure which supports the collection, harmonisation, analysis and cross-linking of OA research data thanks to a set of tools and services that aim to influence publishing practices by (i) enhancing repository interoperability, (ii) supporting a seamless exchange of information among data providers, and (iii) providing value added services for all stakeholders (e.g. monitoring of and reporting on research outputs at institutional level);
- The participation of NOADS in approximately 1000 national events during the OpenAIRE*plus* phase and the organisation of OpenAIRE workshops and a project conference in order to discuss OA issues with key players (e.g. policy support in managing research data and linking it to publications, interoperability between repositories, legal and sustainability issues for OA infrastructures and the implementation of the EC's Open Research Data Pilot);
- Broad online dissemination of OpenAIRE material with over 100K loads and 6K plays of hour workshop and webinar videos on Vimeo, about 140 presentations on Slideshare with more than 28.000 views, 3.700 registered users on the OpenAIRE portal, and about 7.000 users regularly receiving OpenAIRE newsletters;
- Solid and increasing social media presence with 5.5K twitter followers with 1.7 mi impressions, an active Facebook community of 1.125 members, and a LinkedIn community of 385 members.

4. Overall strengths of this tool, including key achievements

The OpenAIRE initiative offers many benefits, especially contributing to operational alignment. The project has strongly promoted Open Access to scientific publications and research data, supported its implementation and hence improved the interoperability, visibility and impact of research.

4.1 *Promotion of Open Access to research at operational and policy levels and support for alignment of Open Access policies*

OpenAIRE has successfully promoted the benefits of Open Access to research amongst related broad groups of stakeholders, especially thanks to a very active involvement of OpenAIRE's National Open Access Desks (NOADS) at national level and the organisation of workshops on key OA issues (see Section 3 above). The network of NOADS brings together experts familiar with national and local developments in their specific jurisdiction, and with related cultural, governance and financing systems. They provide **support and solutions for policy implementations, aligning and transferring practices and new ideas** for research or publishing practices. Thanks to their continuous engagement with the research community they are key in guiding the transition to long-term implementation of Open Access and Open Science policies. They ensure that (i) aligned and validated practices for

¹²⁷ <https://www.openaire.eu/>

data preservation and stewardship are followed wherever research is produced (in particular at the level of individual researchers, research projects and research institutes), and that (ii) **the research community is in charge of future developments in open scholarship**.

This **increased awareness and understanding of OA benefits** across Europe has enabled the **set-up and improvement of OA infrastructures** at national and institutional levels, especially thanks to the support provided by NOADS (see Annex 1). For instance, research institutions that have succeeded in implementing OA repositories can benefit from higher visibility on the Web by showcasing their research outputs via the use of a single online platform as a strategic marketing tool. This in turn allows institutions to monitor, keep a record of and assess their research activities in a centralised manner.¹²⁸

To support the development of OA compliance and infrastructures, OpenAIRE has also contributed to the **elaboration and implementation of national OA policies** and to the latter's **alignment with the EC's OA policies** and recommendations (see list of national OA policy developments in Annex 1). This has been achieved thanks to diverse activities such as the set-up of working groups, the analysis of trends regarding Open Access, the take up of the EC's OA mandate by research funding organisations, the elaboration of national OA recommendations and mandates in line with the EC (i.e. not only valid for EC funded projects but also for all other projects funded nationally), etc.

As a result, OpenAIRE has become a well-recognised brand name across Europe and beyond. By strongly interacting with other OA initiatives in Europe and worldwide, OpenAIRE is now considered as the reference initiative for OA in Europe and has placed Europe in a leading position for Open Access.¹²⁹

4.2 Improved interoperability of research outputs

By fostering the uptake of "OpenAIRE compliance" guidelines across OA infrastructures, OpenAIRE is strongly contributing to **alignment amongst existing and new research data providers** at an operational level. Indeed, in order to ensure open access to research data when appropriate and the preservation of this data, OpenAIRE has supported the adoption of common requirements by several countries on research data formats and management, for example by providing a common metadata¹³⁰ protocol and supporting the set-up of data management plans that comply with H2020 rules. Factsheets and guidelines have been elaborated and trainings have been facilitated to support capacity building with OpenAIRE compliance.¹³¹

This has greatly enhanced the **standardisation and interoperability of research outputs**, hence creating the optimal conditions for their **sharing with and re-use by other researchers** as they are in computer-readable form. This is especially required for datasets and research outputs other than publications, as the issue of Open Access is more recent for these types of data.

4.3 Enhanced access to and visibility of existing research data which aims to facilitate research planning and improves return on investment

OpenAIRE compliance guarantees *centralised* Open Access to research outputs. This increases the **transparency** of past and current research activities and outcomes, hence informing researchers of what has already been achieved in their field of research and how outcomes have been validated, and guiding them in their choices regarding future research questions and activities. Thus, a central platform collecting all OA research outputs and data such as OpenAIRE contributes to **avoiding unnecessary duplication** of research activities and to **improving the efficiency of research progress and the use of financial research resources**.

In addition, by enhancing the visibility of research outcomes, OpenAIRE seeks to promote their effective dissemination to and uptake by end-users in order to support innovation processes, which in turn triggers **higher return on investment in public funding**.

¹²⁸ The OpenAIRE Guide for Research Institutions (2011)

¹²⁹ OpenAIREplus Executive Report (2015)

¹³⁰ Project metadata gathers all research outputs together in one database (i.e. publications, datasets, etc.).

¹³¹ Examples of OpenAIRE learning material: Usage Data Exchange Guidelines (2010), Factsheet on the Open Research Data Pilot in Horizon 2020, three webinars on interoperability issues.

Furthermore, OpenAIRE not only provides a gateway to OA research data, but is also in the process of cross-linking them. This allows to contextualise them and effectively make them even more visible to users. Indeed, OpenAIRE has focused on providing “Enhanced publications” by facilitating the linking of research publications to other research outputs such as datasets and software and to project/funding information. Hence, the OA initiative has contributed to building a “**linked research environment**”¹³² that is more transparent and comprehensive and that provides increased visibility to all key players (i.e. researchers, research projects, research institutions, funders, countries, data providers). As such, this OpenAIRE service allows to assess the current status of Open Access across Europe and its evolution in time, and to monitor research outputs per institution/funder/country, etc.

4.4 Increased potential for efficient impact of research data on research policies

As indicated above, OpenAIRE provides a central record of the nature and content of research outputs. This has allowed to develop research analytics and impact metrics, for instance through the statistical processing of research output data and the identification of patterns and trends in time/per funder/per scientific area.¹³³ So far, OpenAIRE has especially focused on providing statistics that relate to research publications, but is aiming to include an increasing number of other research outputs. As such, OpenAIRE seeks to be able to provide a **mapping tool that identifies research objectives, outcomes and related activities covered** (e.g. per funder or per research area) by analysing research outputs, and that can hence **inform decision-making on research policies**.¹³⁴ Thus, OpenAIRE contributes to increasing the potential influence of research outcomes on future national and transnational research funding strategies and policies, enhancing strategic alignment amongst countries. As OpenAIRE wishes to embrace the global characteristic of Open Access, this mapping service could provide a strong basis for alignment of national research strategies at an international level.

5. Overall limitations with this tool, including difficulties encountered during implementation

OpenAIRE has been facing several challenges, especially as it supports a strong shift in research practices regarding research data policies and management. In addition, the initiative has to constantly adapt its objectives and services to new technical and research needs and advancements.

5.1 Limits of the voluntary approach regarding Open Access development

The OpenAIRE project has relied on a grassroots approach, based on a voluntary engagement of member countries and on an inclusive governance model. This has helped promoting community-building and mutual learning amongst participating partners at the local as well as (trans-)national level. However, this flexible approach has been facing several limitations. Indeed, depending on the involvement of partners, the timing and level of intensity in their uptake of OA guidelines, resulting in national OA policies or infrastructure, can differ from one stakeholder to another. Hence, OpenAIRE seeks to intensify its outreach activities in order to foster greater synchronisation of its partners and related stakeholder communities on OA issues.

Moreover, the OpenAIRE network is suffering from low financial commitment, which triggers difficulties in providing a sustainable funding model for the initiative.¹³⁵ In its current form, OpenAIRE lacks a sustainable approach to structural and financial issues, which is necessary for it to operate as a core Europe-wide information infrastructure. In order to support OpenAIRE’s long-term vision, the network will soon become a legal entity and hence benefit from a structure that can potentially support OA activities in time. The development of a legal form and an appropriate governance structure (see Section 2.3) for OpenAIRE is crucial for strengthening the European Innovation Union and strongly positioning European research at a global level. More specifically, developing OpenAIRE as a legal entity is necessary for the network’s sustainability, credibility and reliability vis-à-vis OA key players, and flexibility in adapting its objectives and activities to new OA needs and potential developments.

¹³² OpenAIREplus Executive Report (2015)

¹³³ <https://www.openaire.eu/infra-monitoring>

¹³⁴ OpenAIREplus Executive Report (2015)

¹³⁵ N. Manola, Presentation “OpenAIRE – An Open Knowledge & Research Information Infrastructure”, ERA-LEARN 2020, September 2015

5.2 Difficulty in bringing together and effectively supporting all key players involved in Open Access issues

OpenAIRE has a broad geographical coverage, which can be challenging when developing adapted tools and approaches to promote mutual learning and coordination amongst participating member countries. The project Consortium had initially been divided into four European regions (North, South, East and West), which allowed to tackle OA challenges at a more regional level. Now that OpenAIRE has significantly advanced in the implementation of OA activities in each European region, it aims to design new innovative approaches for cross-fertilisation and alignment amongst partners.

Furthermore, OpenAIRE carries out activities at various levels (i.e. national, thematic, EU and global levels). In particular, the project has mainly focused on European research outputs up to now, while Open Access consists in a global issue. Thus, in order to effectively develop Open Access, OpenAIRE partners seek to enhance their collaboration with non-European countries.¹³⁶

Lastly, the project brings together a large number of OA stakeholder groups (i.e. research communities, institutions, data providers, ministries). OpenAIRE has hence been facing the challenge of aligning and supporting compliance with OA policies at all levels.¹³⁷ For instance, when the EC sets up a new OA policy, OpenAIRE aims to support not only governments in adopting this new policy at national level, but also all local stakeholders involved in OA. In particular, supporting the implementation of aligned OA practices by all research institutions within one country can be challenging.

5.3 Challenging adaptation to changing research and technological landscapes

Open Access issues are constantly evolving with OA and communication needs of research communities, institutions and funders. Thus, OpenAIRE partners aim to continuously assess the network and its activities in order to address these emerging needs by adapting its governance and range of expertise offered. In addition, technological advancements increase the number of potential types of research outputs, raising the complexity of the research landscape with respect to effective Open Access. They also increase the number of services that can potentially be provided by OA infrastructures and initiatives such as OpenAIRE, which means that OpenAIRE experts need to constantly update their skills and knowledge on recent developments.

As a result, OpenAIRE's activities and proposed services have greatly expanded over the last few years. The network is now facing the difficulty of providing clear messages regarding its mission and operation, and regarding Open Access in general. The challenge lies in showing the diversity of possibilities regarding Open Access, and at the same time having a clear long-term vision for OA which integrates all these possibilities as a whole.

¹³⁶ OpenAIREplus Executive Report (2015)

¹³⁷ N. Manola, Presentation "OpenAIRE – An Open Knowledge & Research Information Infrastructure", ERA-LEARN 2020, September 2015

6. Conclusions: Suitability and key factors of success

Open access to research data is required in order to ensure the **transparency of research outcomes** by demonstrating the quality of research outputs and data that allow to validate research results. It is also the optimal pre-condition for **enhancing their exchange with and re-use by other researchers**, in particular if **data interoperability** issues are addressed. This fosters transnational and transdisciplinary research collaboration within research communities. In particular, Open Access supports **efficient advancement of research knowledge** by increasing awareness and reducing fragmentation of already existing research and related outcomes, as well as by contributing to aligning research methodologies and data collection techniques. In addition, Open Access contributes to effective and aligned dissemination of research outcomes to non-academics stakeholders and end-users, hence increasing the potential for their **uptake in driving technical and social innovations as well as policy-making** in thematic areas. Lastly, the analysis of OA research outputs can provide **guidance to decision-makers in elaborating and aligning future research priorities and related funding strategies at national as well as transnational levels**.

P2Ps can hence significantly benefit from Open Access and should seek to promote this principle amongst their members and apply it to research outputs they have supported or are planning to support.

Key factors of success:

1) At strategic level:

- **Develop a broad common vision for Open Access** (e.g. at JPI level or across several P2Ps) or clearly state the adoption of an existing one (e.g. H2020 OA guidelines): the elaborated vision should engage all P2P members in order to foster ownership and hence ensure the effective application of defined Open Access rules or guidelines.
- **Develop a joint communication and dissemination strategy** that seeks to showcase OA research outputs and promote the uptake of related research outcomes by end-users.

2) At financial level:

- **Secure sustainable funding for research data management and open access publishing/archiving activities:** a business model that financially supports long-term open access to research data should be adopted by the EC and/or by countries themselves (at national level and/or via P2Ps).

3) At operational level:

- **Promote the alignment of P2P member countries' Open Access policies** amongst them (at government and institutional level) as well as with broader policies and guidelines at the EU and global levels: the latter is particularly important as it allows to address the global aspect of the Open Access challenge.
- **Promote the implementation, use and alignment of national and transnational OA infrastructures:** for instance, promoting the implementation of OpenAIRE-compliant infrastructures at institutional level and the use of the OpenAIRE platform allows for a centralised access to OA research outputs at transnational level.
- **Design and implement an aligned data management plan** for all research projects that involves all key players in Open Access and data collection and storage: in particular, relying on data providers that have implemented aligned OA policies (e.g. that are OpenAIRE-compliant) greatly facilitates open access to research outputs.
- **Centralise and cross-link all research information** (including research data and related project/funding information): this contributes to building a comprehensive research environment and supporting research policy making (e.g. by using OpenAIRE as a mapping tool of research outputs and activities).
- **Facilitate the cooperation of member countries across P2Ps** on OA issues in order to support exchange of best practices and transnational alignment regarding transversal operational aspects such as the development of OA policies, guidelines and infrastructures, and the interoperability of research outputs.

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Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No.8- The Network of Centres of Excellence in Neurodegeneration (CoEN)

Due date of deliverable: April 2016

Actual submission date: January 2017

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, outputs and overall strengths and weaknesses of a specific modality that supports greater alignment of research activities across countries, namely the **Network of Centres of Excellence in Neurodegeneration (CoEN)**, which facilitates the launch of transnational calls for project proposals that are open to recognised national research institutes (i.e. Centres of Excellence) in the field of degenerative diseases. The alliance brings together organisations from nine countries, including large nationally mandated Centres of Excellence that have call funding resources as well as national funding organisations that provide funding to recognised Centres of Excellence if the latter have no funding capabilities. While focussing on the specific experience of CoEN, the case study also provides lessons for other public-to-public research networks wishing to develop a similar instrument to promote **collaborative research, institutional cooperation and coordination amongst European research funding and performing organisations**, and alignment more generally. The case study does however not aim to provide an in-depth assessment of CoEN nor of the instrument of the network of Centres of Excellence.

The study highlights CoEN's many benefits. By enhancing the **collaboration between some of the most influential research centres** working in neurodegeneration in participating countries, CoEN has allowed to establish new partnerships across Europe and North America. The initiative has facilitated the **implementation of high quality research** by leveraging on the critical mass, resources and expertise of existing national research centres, fostering operational alignment of research activities and implementing a common peer review process. Moreover, CoEN's strategic research focus on high risk/high impact research provides **high added value and complementarities to existing national and transnational research programmes and networks**, while developing several partnerships with related European and international initiatives in order to **benefit from higher visibility and political interest**. Regarding the operation of the alliance, CoEN members have adopted a **streamlined governance model, a central management structure and a flexible and sustainable country-driven funding mechanism** in order to effectively support the network's targeted membership and catchment of research centres and share the investment risk related to the type of research funded by CoEN.

Yet, the CoEN initiative has also been facing several limitations. In particular, it has been confronted with: (i) the challenging task of effectively reaching out towards the industry; and (ii) the need for more networking activities in order to keep members involved and achieve a common understanding of CoEN's research priorities and implemented activities among the research community.

The case study builds on the ERA-LEARN 2020 Task 4.1 ("Definition and Typology of Alignment"), and relies on a review of existing literature and targeted exchanges with a member of the Secretariat of the CoEN Oversight Group. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 "Assessment of Current Approaches to Alignment". The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to Louise Richards (Secretariat of the CoEN Oversight Group, Medical Research Council – MRC) for her valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, outputs and overall strengths and weaknesses of a specific alignment modality, namely the **Network of Centres of Excellence in Neurodegeneration (CoEN)**, which consists of an alliance of national organisations with funding capabilities, including national research funding organisations (RFOs) and large national research performing organisations (RPOs). The alliance facilitates the development of a targeted joint research strategy and the management of joint calls for project proposals that are addressed to recognised national Centres of Excellence in the field of degenerative diseases. The study assesses in what context such a tool is best used for promoting greater alignment of national research programmes and activities. While focussing on the specific experience of CoEN, it also provides **lessons for other JPIs and public-to-public research networks** wishing to develop a similar instrument to promote collaborative research, institutional cooperation and coordination amongst European research funding and performing organisations, and alignment more generally.

This alliance is used in order to foster transnational research cooperation among designated research performing organisations. It mainly supports the implementation phase of the research programming cycle and allows for operational alignment. Participating members provide funding through a competitive bidding process to research groups from recognised Centres of Excellence. Thus, this research alliance also promotes alignment during the research funding phase.

2. Key features of CoEN

2.1 Overview

The Centres of Excellence in Neurodegeneration (CoEN) initiative is a network of national research funders (i.e. RFOs and nationally mandated Centres of Excellence with funding capabilities) that seeks to enhance collaboration among recognised research centres (i.e. Centres of Excellence) in the field of neurodegenerative disorders such as Alzheimer's and Parkinson's Disease, Multiple Sclerosis, Motor Neurone, Huntington's and Prion Disease. It was founded in 2010 by national research funders from Canada, Germany and the United Kingdom and now brings together nine countries¹³⁸. It is aligned with the broader EU Joint Programme on Neurodegenerative Research (JPND)¹³⁹ and complements the research activities undertaken through this initiative, although CoEN operates as an independent entity (see Section 2.3). To date, CoEN has facilitated the joint launch of three transnational calls for project proposals in 2011, 2013 and 2015 and the development of a common strategic orientation focused on **high risk/high pay-off** research. Targeting **recognised research centres** has enabled the network to facilitate the implementation of high quality research based on a critical mass of expertise, standardised methodologies and procedures, and enhanced sharing of equipment and data. .

Age-associated neurodegenerative disorders represent a major public health issue at European level and worldwide. They are affecting a growing number of people as the population ages. Yet the causes and mechanisms of these diseases remain largely unknown. Existing treatments are hence limited and focus on the symptoms rather than on the origin and development of the disorders. .¹⁴⁰ Support for neurodegeneration research is required in order to advance knowledge in this field and potentially trigger breakthroughs for innovative treatments. As a country-driven initiative, CoEN seeks to contribute to this overall objective by connecting leading research groups across Europe and Canada.

2.2 Mission and activities

The main aim of CoEN is to address the major challenges and barriers to progress for neurodegeneration research through innovative and progressive transnational collaborative science. CoEN also seeks to provide a mechanism for industry (e.g. the biopharmaceutical and diagnostic companies) to link to its Centres of Excellence, and to develop novel and effective industry partnerships in pre-competitive research.

¹³⁸ Member countries are Canada, Flanders, France, Germany, Republic of Ireland, Italy, Slovak Republic, Spain and the United Kingdom.

¹³⁹ See Annex 1 for more information on JPND

¹⁴⁰ <http://www.neurodegenerationresearch.eu/about/why/>

The scientific scope covered by CoEN is broad. The network encourages researchers to advance knowledge of neurodegenerative mechanisms as well as to explore new ways of diagnosing and treating such diseases. Connectivity with research in related areas such as inflammation and sensory neuroscience, or vascular and mental health is encouraged, as is outreach to experts in the fields of physical and computational science.

Through the CoEN network, participating members commit national funding resources in order to **launch transnational calls for joint project proposals**. In particular, CoEN facilitates:

- 1) The scoping of the call;
- 2) The mutualisation of national funding resources;
- 3) The launch and management of the call, including joint agreement on proposals to be funded based on the recommendations of an international panel of experts;
- 4) The monitoring of selected projects;
- 5) Networking activities within the CoEN research community;
- 6) Dissemination of project outcomes, in particular via the CoEN website.

2.3 Governance structure of the network

The network has adopted a clear governance model. The CoEN Oversight Group is the decision-making body of the network. In order to keep its size manageable, it consists of two representatives (i.e. scientific and administrative) per funding partner. It deals with all issues related to the development and management of the CoEN initiative, i.e.:

- the management process and procedures of joint calls;
- membership of the network;
- strategic partnerships with other related initiatives such as JPND;
- communication of the network and its projects' outcomes.

The Oversight Group is supported by a Secretariat which has been provided in-kind by the Medical Research Council (United Kingdom). The Secretariat coordinates the Oversight Group meetings and oversees the implementation of the Oversight Group's decisions.

An international peer review panel is temporarily established during each call in order to assess submitted proposals and recommend the projects that are suitable for funding. The ranked list obtained is validated by all CoEN members without any other evaluation at national levels and funded projects are selected from this list according to available national funding.

In addition, as mentioned above, the CoEN network is aligned with the development of the JPND initiative. There is an overlap of membership and of persons involved in governing bodies of both initiatives, which facilitates the latter's interaction and complementarity and avoids duplicative calls.¹⁴¹ For instance, national representatives for United Kingdom within the Oversight Group are also part of the decision-making body of JPND (i.e. the JPND Management Board). This ensures an efficient communication flow and coordination between both initiatives when scoping CoEN and JPND calls. However, as mentioned in Section 2.1, CoEN operates independently from JPND, which means that there is no structural link between CoEN and JPND governing bodies.

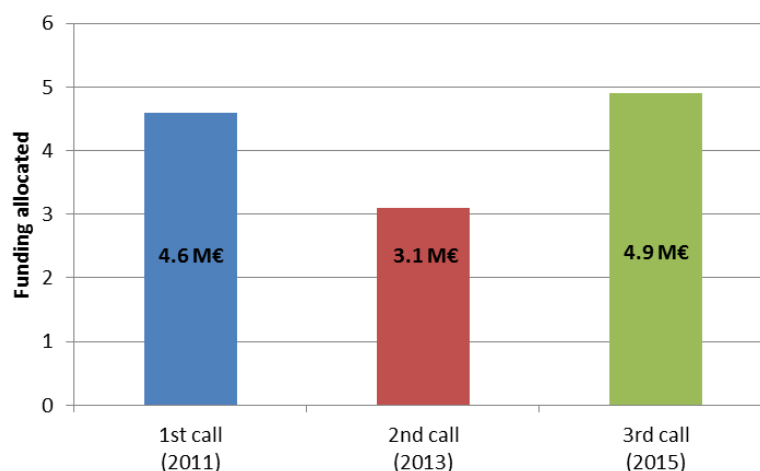
2.4 Approximate resources and time needed for implementation

The funding of the three CoEN joint calls relied on a **virtual common pot**, which means that each participating national funder provided in-cash funding for the research activities undertaken by the Centres of Excellence within its country. As explained in Section 2.1, national funders involved in the CoEN network can include national funding organisations as well as nationally mandated Centres of Excellence with funding capability. In the first case, national funding organisations commit funding to be distributed to the Centre(s) of Excellence within the concerned country that participate in selected CoEN research projects. In the second case, nationally mandated Centres of Excellence secure funding for their own research activities under CoEN projects. CoEN calls are only open to Centres of Excellence that have been recognised by the network. Each funder administers the grants according to their respective policies and procedures, and assumes all costs related to the administration of these grants. Costs for peer review of the applications (e.g. travel, accommodation and panel meeting costs)

¹⁴¹ Network of Centres of Excellence in Neurodegeneration (CoEN) – Oversight Group, 1st meeting (December 2010)

are shared equally between each participating CoEN partner. As mentioned above, the Secretariat is supported as an in-kind contribution.

Figure 1. Funding commitment towards CoEN joint research projects



Source: 9th CoEN Oversight Group Meeting Report

So far, CoEN joint calls have been launched every two years. The funding cycle and strategic direction adopted by the CoEN Oversight Group has been developed and revised over time. The timeline below (Fig. 2) gives the evolution of CoEN's activities to date.

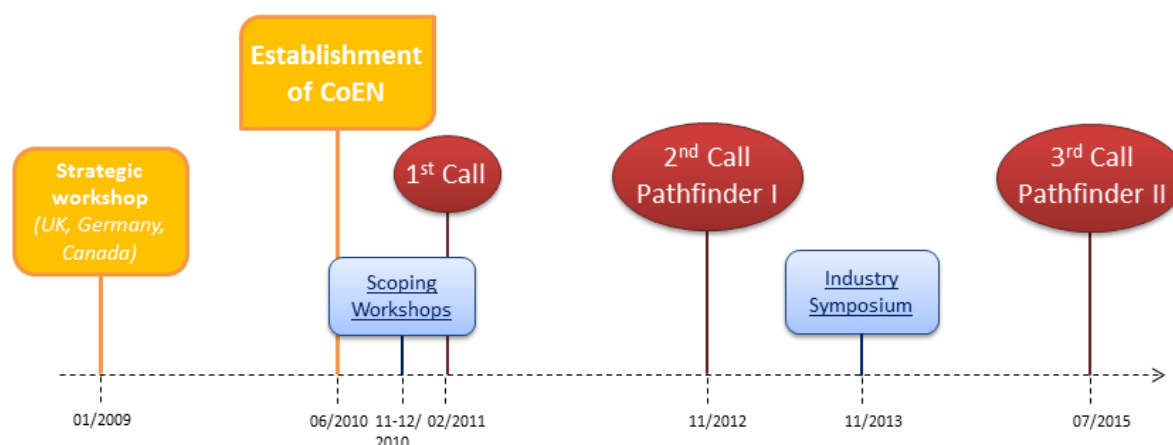
As a first step towards the set-up of the CoEN network, the Medical Research Council (MRC; UK) convened a trilateral workshop in January 2009 to help identify areas for potential cross-border collaboration which formed the basis of the CoEN initiative. After the official establishment of the network in June 2010, founding members signed a Memorandum of Understanding in September 2010.

Initially CoEN adopted a traditional approach and defined priority research areas to be addressed through the joint call. Scoping workshops took place before launching the call in order to identify specific research needs. The first call for proposals involved six CoEN partners and addressed bottlenecks in infrastructure and resource.

Following this first call, the 'Pathfinder' concept was developed and has been the basis for the subsequent calls in 2013 and 2015, involving seven and six national funders respectively (CoEN members do not all participate in each call). Future calls will also rely on this strategic concept (e.g. in 2017). Pathfinder calls set out to encourage the community to think 'outside the box', to stimulate new and unconventional approaches and creative solutions to the challenges of neurodegeneration research by undertaking high-risk / high-payoff research, which, if successful, will provide a step change in neurodegeneration research. The scientific remit for Pathfinder awards is broad in scope, and projects may include studies to illuminate our understanding of neurodegenerative mechanisms, or create technological advances to support novel diagnostic or therapeutic approaches.

In addition to calls for proposals, CoEN organised a Symposium in November 2013 with stakeholders from the pharmaceutical industry in order to present the achieved and expected project outcomes and to understand how CoEN research can benefit commercial organisations.

Figure 2. Timeline for implementation



Source: Own compilation

3. Principal outputs to date

CoEN has contributed to advancing knowledge on neurodegenerative processes and therapeutic approaches. So far, the network has:

- Launched three joint calls that enabled the implementation of 24 transnational research projects (i.e. 8 projects for the 1st call, 5 projects for the 2nd call and 11 projects for the 3rd call);
- Invested national financial resources amounting to over 12.5 M€ over the three joint calls;
- Organised a workshop with the pharmaceutical industry, including Pfizer, Sanofi, GSK, MSD, Lilly and others, to foster its involvement in CoEN projects and to discuss first project results and expected outputs.

Joint research projects that had been selected through the first and second CoEN calls have now been completed and have led to the development of innovative models on disease mechanisms and new opportunities for elaborating potential treatments. In particular, projects from the first CoEN call focus on various research questions including the development of new disease models, the identification of biomarkers and the harmonisation of methodologies for clinical studies. The projects brought together a wealth of resources and expertise from a number of large research institutes in different countries to tackle scientific questions that are key to advancement within the field.

4. Overall strengths of this tool, including key achievements

The CoEN initiative has adopted a strategic focus on enhancing collaboration between recognised Centres of Excellence and provides high added value to existing national and transnational research. CoEN has succeeded in **fostering new partnerships across Europe and North America that previously did not exist**¹⁴², and in providing a suitable mechanism for promoting transnational research collaborations between some of the most influential laboratories working in neurodegeneration in participating countries.

4.1 Implementation of high quality research thanks to operational alignment of research activities and a common peer review process

A key advantage of the CoEN structure is that it **leverages on already existing national centres** selected as a result of stringent peer review processes. CoEN research projects can therefore be launched rapidly and benefit from resources that are appropriately targeted towards researchers who can deliver high quality science. Large centres and institutes have the necessary critical mass to focus resources and expertise on key barriers to progress in neurodegeneration. In addition, an effort to **'cluster' national centres of excellence** offers longer-term possibilities to both attract recognised scientists/clinicians, provide access to cutting-edge technologies and enhance interdisciplinary approaches, and to help create a high quality platform for training and capacity building.

¹⁴² 4th CoEN Oversight Group Meeting (December 2011)

Furthermore, CoEN has implemented a joint procedure for assessing and selecting project proposals that ensures the funding of high quality projects. A peer-review panel composed of leading international experts from academia and industry is convened to assess the submitted proposals according to predefined criteria. Those scoring over a certain quality threshold are qualified as fundable and ranked. Funding is allocated using a virtual common pot model and following the ranked list with no jumping, hence ensuring the high quality of funded research projects. The CoEN Oversight Group has noted that **the quality of submitted proposals has significantly increased** with subsequent Pathfinder calls.

4.2 Development of a transnational research network with a unique research approach

CoEN's strategic approach supports the principle of **avoiding unnecessary duplication of research efforts** and **providing added value and complementarities to existing research programmes and networks** at national and transnational levels¹⁴³). Hence, CoEN members have launched three joint calls in order to fund research that would not have been funded otherwise. Indeed, the Pathfinder scheme has been deemed an appropriate niche for CoEN and has allowed the organisation to be distinct from other transnational funding calls focusing on the same research area such as JPND and the European public-private Innovative Medicines Initiative (IMI)¹⁴⁴, and for many countries, distinct from national grant schemes. By demonstrating to national funding providers the uniqueness of the research financed through the CoEN initiative, CoEN members are more effectively **ensuring continued financial support**, thereby contributing to the long-term sustainability of the network.¹⁴⁵

4.3 Sustainable financial alignment thanks to a country-driven and nationally funded transnational research initiative

Launching a transnational call allows member countries to pool together national financial resources. This is particularly valuable for the CoEN network as it funds scientifically riskier research. Thus, CoEN's transnational approach enables the **sharing of investment risk** among participating countries. In addition, the launch of a joint call focusing on Centres of Excellence indirectly facilitates the mobilisation of valuable in-kind resources across these national research centres (e.g. equipment, new technologies, leading researchers, etc.).

Furthermore, the CoEN network only relies on the engagement of participating countries and committed national financial resources. Although call budgets could be increased with co-funding from the European Commission (e.g. through an ERA-NET Cofund), CoEN's strategy is to rely on a flexible and independent agenda. Indeed, **the network's current governance and funding mechanism can easily take into account national constraints and requirements**. It allows for more flexibility regarding funding commitments and application, management and reporting requirements, in contrast to complex procedures related to EC co-funding. This makes the network more accessible to applicants as well as to CoEN member countries.¹⁴⁶ **CoEN members are committed to supporting a long-term initiative that is self-sustainable** without the need for EC co-funding.

4.4 Development of strategic partnerships with related European and international initiatives

Neurodegenerative disorders represent a major public health issue that is a strong political priority on the international agenda. CoEN has benefited from its **alignment with the EU Joint Programme on Neurodegenerative Research (JPND)**, which has been a valuable intermediary for showcasing CoEN's work at the strategic level, especially as JPND has a close relationship with the European Commission and the Global Alliance against Dementia. Also, CoEN benefited from the support of the United Kingdom's Government for the CoEN Industry workshop which was held in the context of the G8 Dementia Summit hosted by the UK in December 2013.¹⁴⁷ The workshop was then highlighted during following G7 meetings on dementia.¹⁴⁸

¹⁴³ <https://www.imi.europa.eu/>

¹⁴⁴ <https://www.imi.europa.eu/>

¹⁴⁵ 4th CoEN Oversight Group Meeting Report (December 2011)

¹⁴⁶ CoEN Call for Proposals – Allocation of Funds Meeting and CoEN Oversight 3rd Group Meeting (July 2011)

¹⁴⁷ 7th CoEN Oversight Group Meeting (May 2013)

¹⁴⁸ P. Amouyel, Presentation on Joint Programming in Neurodegenerative Disease Research (JPND), 3rd Global Dementia Legacy meeting, Tokyo, 6 November 2014; <https://www.nia.nih.gov/about/events/2015/g7-dementia-research-coordination-and-collaboration-meeting>

4.5 Simple governance model and targeted membership for efficient operational alignment

The governance structure of the CoEN network relies on a **single governing and decision-making body** (i.e. CoEN Oversight Group), which allows for a more manageable operation, especially with the support of its Secretariat. As such, procedures and requirements for the call launch and management, applications, evaluation and monitoring are collectively agreed amongst CoEN members. The network's governance also facilitates efficient decision-making as strategic decisions are provided by CoEN members only. In addition to its independence from the EC (see Section 4.3 above), the simplicity of CoEN's governance model also contributes to enabling CoEN to provide a flexible coordination support that can adapt to member's needs and requirements. In particular, it is most suitable for effectively supporting a targeted catchment of research centres and associated researchers.

In addition, CoEN membership is open to national funding organisations linked to one or several identified Centres of Excellence, or nationally mandated Centres of Excellence with funding capability.¹⁴⁹ This facilitates a peer-to-peer collaboration within the network and a balanced decision-making process where partners equally have the capability to provide funding towards CoEN joint calls.

5. Overall limitations with this tool, including difficulties encountered during implementation

The CoEN network has been confronted with challenges regarding the implementation of efficient outreach towards the industry, community building within the network and well-known limitations of the virtual common pot mechanism.

5.1 Challenging outreach towards the industry

As indicated in Section 3, CoEN organised a workshop with stakeholders from the industry in order to showcase CoEN's research activities and results and identify the added value of a partnership between CoEN and industry. Industry representatives highlighted that the innovative and collaborative research supported through the CoEN initiative was precisely the type of activity needed to provide novel insights and the pathways to explore potential solutions to dementia.¹⁵⁰ However it was noted that communication could be improved between members of the CoEN research community and industry to better highlight the added value of CoEN's research.

Industry has limited resources for discovery science and needs access to basic and preclinical studies before committing to the development of a specific therapy or diagnostic agent. In addition, industry could benefit from the cutting-edge technology available in laboratories of CoEN partners. A recognised network of centres of excellence provides a single point of contact through which significant interest from industry to promote, translational science and the rapid implementation of new therapies and public health interventions. An ambition is that activities driven by networked Centres of Excellence will provide the platform of choice for collaboration with industry and global partners on large-scale projects. Aligning CoEN's research agenda with the needs of industry may provide a route for translational science and the rapid implementation of new therapies and public health interventions. In return, a partnership with the industry would give CoEN partners access to industry data (e.g. on early drug-development). This could provide valuable inputs for discovery research (e.g. on potential disease mechanisms) and potentially guide CoEN's research strategy.¹⁵¹ JPND is developing a strategy for interaction with industry and the niche for CoEN will be part of the discussion.

5.2 Need for more networking activities in order to keep members involved and achieve a common understanding among the research community

The CoEN Oversight Group aims to organise a symposium that is targeted towards CoEN members and researchers.¹⁵² The objective of this event is to foster networking amongst researchers and synergies amongst CoEN joint research projects, which would help develop community building and a common understanding of research priorities and implemented activities both by researchers and funding providers.

¹⁴⁹ 9th CoEN Oversight Group Meeting, 18th March 2016

¹⁵⁰ In particular, industry representatives commented that CoEN was "an important piece in the global pipeline of innovation needed to face this paramount public health challenge".

¹⁵¹ 8th COEN Oversight Group Meeting, Tuesday 17th June 2014

¹⁵² 9th CoEN Oversight Group Meeting, 18th March 2016

5.3 Limits of the virtual common pot

The most significant and well-known limitation of the application of a virtual common pot for the funding of a transnational call is the potential inability to exactly follow the ranked list of selected joint project proposals. Indeed, the virtual common pot mechanism is limited by dependence on national budget availability and the distribution of applicants from member countries on each proposal. Once the point was reached in the ranking list where a Sponsor Group has insufficient funds remaining from their budget the allocation of funding to projects cease. Thus, national funding gaps may not allow the funding of high quality joint research projects. This can be avoided by using more flexible funding models (e.g. through the implementation of a funding reserve at national level or the adoption of a real common pot).

In addition, the virtual common pot triggers time-consuming bureaucracy at national level in order for transnational research proposals and consortia to comply with national eligibility criteria. Harmonising the latter among network member countries is however challenging and can be impossible in certain countries. Despite that, CoEN has not encountered any major issues related to the application of national criteria and procedures when administrating grants.

6. Conclusions: Suitability and key factors of success

The set-up of a network of recognised Centres of Excellence is most suitable for building on existing cutting-edge infrastructure, high quality expertise and significant national funding resources, the latter being especially valuable to share the investment risk related to “high-risk” research. This allows to maximise the added value of transnational research and also provides an opportunity for capacity building. Moreover, such a network facilitates the cooperation amongst most influential research centres in a given research area, which ensures high impact of the network’s scientific results.

Establishing a small network that focuses on a narrow scientific scope provides greater flexibility to modify and even shift the network’s joint research strategy, ensures a more manageable operation and contributes to higher impact in its specific field of research (i.e. niche).

Key factors of success:

1) At strategic level:

- **Develop a common strategic vision and agenda among network members:** in particular, this strategy should be aligned with related national and international initiatives to ensure complementary and avoid duplications. This hence allows to provide high added value to existing national and transnational research and contributes to enhancing long-term support from members.
- **Carefully manage the network’s membership:** targeting a specific group of potential members allows for peer-to-peer collaboration and balanced decision-making processes. Strict criteria should be applied in order to maintain a small sized-network and ensure scientific excellence.
- **Develop strong interactions with highly visible and more political initiatives** in order to ensure high impact on the concerned international agenda and related political strategies.

2) At financial level:

- **Develop a flexible mechanism for the funding of joint projects:** this funding mechanism should take into account national funding and monitoring constraints and requirements, while enhancing investments in selected Centres of Excellence and facilitating the funding of best joint research projects (i.e. by following the ranked list of proposals for instance thanks to national funding reserves or a real common pot approach).
- **Enhance the willingness of network members to support the operation of the network** thanks to an adapted financial mechanism (e.g. costs of peer review shared among participating partners, costs for the administration of awards shared or subsumed by respective funding agency, provision of in-kind resources from members).

3) At operational level:

- **Build a streamlined governance model** that gives the network flexibility and efficiency in strategic and operational/financial decision-making.
- **Set up a management structure** (e.g. Secretariat) to coordinate and provide a day-to-day support for the launch and management of calls and other activities related to the operation of the network.
- **Develop a robust peer-review procedure** undertaken by international expert panel in order to ensure the scientific excellence of funded research projects.
- **Actively disseminate scientific outcomes**, for instance through a website but also and more importantly through the collaboration with end-users for an efficient uptake and application of results.

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Presentation

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http://eulachealth.eu/wp-content/uploads/2014/11/3_JPND_EU_LAC_Madrid_Amouyel.pdf

Consulted websites

EC – Public Health – Brain and neurological diseases:

http://ec.europa.eu/health/major_chronic_diseases/diseases/brain_neurological/index_en.htm

CoEN: <http://www.coen.org/home.html>

IMI: <https://www.imi.europa.eu/>

JPND: <http://www.neurodegenerationresearch.eu/>

ANNEX 1. JOINT PROGRAMME ON NEURODEGENERATIVE RESEARCH¹⁵³

The Centres of Excellence in Neurodegeneration (COEN) Initiative operates as a parallel research initiative under the umbrella of the EU Joint Programme on Neurodegenerative Research (JPND). JPND is the largest global research initiative aimed at tackling the challenge of neurodegenerative diseases. It has identified through its Research Strategy common research goals that would benefit from joint action between countries in order to accelerate progress on solutions that can alleviate the symptoms, and lessen the social and economic impact for patients, families and health care systems.

There are three main components to this work:

- Improve the scientific understanding of the disease;
- Improve the medical tools available to doctors to identify and treat the disease;
- Improve the social care and structures available to assist patients, their families, and health service providers so that patients can receive optimum care at all stages of their illness.

The neurodegenerative diseases (ND) that JPND focuses on are:

- Alzheimer's disease (AD) and other dementias;
- Parkinson's disease (PD) and PD-related disorders;
- Prion disease;
- Motor neurone diseases (MND);
- Huntington's Disease (HD);
- Spinocerebellar ataxia (SCA);
- Spinal muscular atrophy (SMA).

JPND's goals are:

- To add value to national investments through coordinated action;
- To encourage the development of national research strategies in ND;
- To engage in partnership to reach the full potential of JPND.

JPND VISION: *To find cures for neurodegenerative diseases and to enable early diagnosis for early targeted treatments.*

JPND MISSION: *To bring together researchers, existing research evidence and national funding bodies to investigate the key research questions and barriers to progress in this area; To increase coordinated investment in neurodegenerative disease research aimed at finding causes of disease, developing cures, and identifying appropriate ways to care for those with neurodegenerative disease.*

JPND IMPLEMENTATION PROCESS:

JPND's implemented activities are presented in Fig.1 below. An important first objective of JPND was the drafting of a Strategic Research Agenda (SRA), which defines the strategic and scientific priorities that would benefit from co-ordination at the European level.

JPND executes its strategy through an implementation plan that is agreed to every three years. The plan consists of a number of major activities, including:

- Annual Calls for proposals launched in priority research areas;
- Alignment Actions to promote alignment of research activity across Europe and focus on emerging scientific themes;
- The CoEN initiative, which operates independently and in alignment with JPND.

¹⁵³ <http://www.neurodegenerationresearch.eu/>

Figure 1. JPND's implementation process



Source: Own compilation



Horizon 2020 Call: H2020-INSO-2014

Proposal number: SEP-210134170

Case Study No. 9- JPI Climate's Strategic Research and Innovation Agenda (SRIA)

Due date of deliverable: April 2016

Actual submission date: January 2017

Dissemination level: Wider public

Lead contractor for this deliverable: INRA

Contributors: MIUR, UNIMAN, AIT



ABSTRACT

This case study examines the key features, methodology and overall strengths and difficulties in implementing an essential step of the Joint Programming Process, namely the elaboration of a common Strategic Research (and Innovation) Agenda (SRA or SRIA) in a specific area of research. The case focuses on the **SRA updating exercise conducted in the context of the Joint Programming Initiative “Connecting Climate Knowledge for Europe” (JPI Climate)**, which led to the development of a new Strategic Research and Innovation Agenda for 2016-2025. The adoption of a common vision and agenda in a specific field of research is a pre-requisite for effective joint programming and for fostering alignment at the strategic/policy level. The SRA/SRIA is the common base required to allow countries to collectively agree on areas of cooperation and on joint research actions to be carried out forward. While focusing on the specific experience of JPI Climate, the case study also provides lessons for other JPis and public-to-public research partnerships (P2Ps) wishing to develop a similar approach. The case study does however not aim to provide an in-depth assessment of JPI Climate’s SRIA elaboration.

The study highlights the benefits of this SRA updating exercise. The process relied on an **inclusive approach that aimed to foster high involvement and leadership of JPI member countries and strong ownership of achieved outcomes** (i.e. content of the new SRIA) in order to ensure their long-term engagement in and support of JPI activities. This was greatly supported thanks to the **establishment of a Task Force** in charge of steering the SRA updating process and writing the document, which only consisted of Governing Board members, hence **giving the leadership on the SRIA’s content to research funders**. Moreover, JPI members aimed to develop a **long-term vision** that implicitly integrates JPI Climate’s past and future activities and that **focuses on more strategic objectives** in order to effectively support alignment at the policy level. For this purpose, the new SRIA is much shorter compared to the first one and can be disseminated more easily. Lastly, the updating of JPI Climate’s SRA allowed to **integrate strategic research and innovation objectives** by relying on a cross-cutting and challenge-driven approach, which was not the case for the first SRA as the latter was more discipline-oriented. It required a **collaborative process that enabled high involvement of academic and non-academic stakeholders**, by engaging with related JPI governing bodies and directly seeking the feedback of stakeholders via a public consultation. As a result, the new SRIA is more stakeholder-oriented than the previous one and expresses the desire to have a better outreach to stakeholders, particularly to relevant research communities.

Yet, JPI Climate also encountered several challenges that it managed to address successfully. In particular, it was confronted with: (i) the time-consuming effort and complexity of the SRIA elaboration process; (ii) the challenge to optimally integrate all key players in the elaboration process of a Strategic Research Agenda; and (iii) the need to secure appropriate resources in order to effectively support the elaboration of the SRIA.

The case study builds on the ERA-LEARN 2020 Task 4.1 (“Definition and Typology of Alignment”), and relies on a review of existing literature and a targeted interview with a member of the JPI Climate Secretariat who was involved in JPI Climate’s SRIA elaboration and the coordinator of JPI Climate. The case is part of a series of nine short case studies that form the basis of the ERA-LEARN 2020 Task 4.2 “Assessment of Current Approaches to Alignment”. The nine case studies that have been selected for this Task each rely on a different instrument (Member-State instrument or EC instrument, e.g. ERA-NET), cooperation mode (e.g. networking amongst researchers, programme integration, institutional cooperation, etc.) and approach (strategic, operational and/or financial) that promote alignment, and that are often put in place at different stages of the research programming cycle (planning, strategy, implementation, etc.). The focus of the following case study (i.e. SRIA elaboration) can also be considered as part of the Framework Conditions of Joint Programming, several of which are also analysed in the ERA-LEARN 2020 Task 2.2 (“Support for implementation of Framework Conditions for the JPI community”).

ACKNOWLEDGEMENTS

The case study has been written by Madeleine Huber under the supervision of Caroline Lesser from the FACCE JPI Secretariat (Joint Programming Initiative on Agriculture, Food Security and Climate Change) / Institut National de la Recherche Agronomique (INRA). The author is grateful to Alexandre Fernandes and Petra Manderscheid (member and Executive Director of the JPI Climate Secretariat) for their valuable inputs. She would also like to thank the ERA-LEARN Consortium partners for their useful suggestions on earlier drafts of this case study.

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1. Introduction

This case study examines the key features, methodology and overall strengths and difficulties in implementing an essential step of the Joint Programming process, namely the **elaboration of a common Strategic Research (and Innovation) Agenda (SRA or SRIA)**. The case focuses in particular on the SRIA developed by the *Joint Programming Initiative “Connecting Climate Knowledge for Europe”* (JPI Climate) thanks to an updating process of its first SRA.

The adoption of a common vision and agenda in a specific field of research is a **pre-requisite for effective joint programming** and for fostering **alignment amongst research activities at the strategic/policy level**. The Strategic Research Agenda is the common base required to allow countries to collectively agree on areas of cooperation and on joint research actions to be carried out forward.

The study assesses how such an approach is best used for promoting greater alignment of national research strategies and activities. While focussing on the specific experience of JPI Climate, the case also provides **lessons for other JPIs and public-to-public research networks (P2Ps) wishing to develop a similar approach**.

According to the Typology of Alignment (ERA-LEARN 2020 Task 4.1), the identification and adoption of common strategic research priorities by member countries of a JPI takes place during the research strategy phase. It relies on joint foresight and mapping of national and transnational research activities, as well as on the identification of national and European research priorities. The elaboration of a Strategic Research (and Innovation) Agenda mainly involves national representatives of ministries and research funding organisations.

2. Key features of JPI Climate’s approach for the elaboration of a Strategic Research and Innovation Agenda

2.1 Overview

The Joint Programming Initiative “Connecting Climate Knowledge for Europe” (JPI Climate) was launched in 2011. It brings together 17 countries¹⁵⁴ and provides a transnational research programming and coordinating platform for research performers and funders across Europe in the field of climate research (see Annex 3). In the face of climate change, JPI Climate aims to contribute to the transition to a low-carbon and climate-resilient society in line with national, European and international long-term climate policy objectives (e.g. Paris Agreement, United Nations Framework Convention on Climate Change, EU climate targets for 2020, 2030 and 2050).

In order to align national strategies and programmes for climate research and hence contribute to the European Research Area, JPI Climate members jointly elaborated and adopted a Strategic Research Agenda in 2011. The latter highlights common policy-relevant research priorities that were identified collectively by academic and non-academic stakeholders from partner countries (see Annex 2). These research areas are being addressed jointly through the implementation of transnational research activities.

JPI Climate members have recently updated their joint SRA and as such adopted a new SRIA¹⁵⁵ for the timeframe 2016-2025 in order to (i) reflect the evolved landscape of climate research, (ii) further showcase JPI Climate’s level of ambition in facilitating the delivery of required climate knowledge and services, and (iii) explicitly highlight the strategic focus of JPI Climate on innovation, as the new title indicates. Compared to the previous SRA, JPI Climate’s new SRIA has been improved mainly regarding the following two aspects:

- The developed SRIA is a much more **strategic and challenge-driven document** than the first SRA, which was discipline-oriented and did not sufficiently express the strategic vision of JPI Climate;
- Its content is also more **stakeholder- and innovation-oriented**, which is the result of a large consultation process with relevant academic and non-academic stakeholder communities that had not been put in place for the elaboration of the first SRA.

The SRIA elaboration process has led to the collective agreement amongst JPI Climate partners on strategic objectives (see Annex 3). In particular, the updated SRIA identifies three overarching challenges that are

¹⁵⁴ Member countries are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Spain, Sweden and The Netherlands; Denmark, Estonia, Romania, Slovenia and Turkey are associated members.

¹⁵⁵ JPI Climate’s updated SRIA 2016-2025 is available online:

http://www.jpi-climate.eu/media/default.aspx/emma/org/10871632/JPI_Climate_SRIA.pdf

connected and can be addressed through the strategic mechanism of “connecting people, problems and solutions in a systemic approach”:

- 1) Understanding the processes and consequences of climate change;
- 2) Improving knowledge on climate-related decision-making processes and measures;
- 3) Researching sustainable societal transformation in the context of climate change.¹⁵⁶

2.2 Methodology

JPI Climate’s overall approach to update its Strategic Research and Innovation Agenda relied on collaborative tools such as workshops, surveys and consultations. This enabled the engagement of all relevant scientific communities as well as of a large number of stakeholders and experts. Through the elaboration of JPI Climate’s first Strategic Research Agenda in 2010-2011, JPI member countries sought to identify and agree on research areas that required a transnational approach for research implementation and the alignment of national research strategies. The main goal of the recent update of JPI Climate’s SRA conducted in 2015-2016 was to elaborate a more visionary and more *strategic* document.¹⁵⁷ Key steps included:

- 1) Establishment of a Task Force in charge of steering the updating process;
- 2) Internal consultation among members of main JPI Climate governing bodies (see Governance Structure in Section 2.3);
- 3) Stocktaking event involving stakeholders in order to have their point of view on the updated SRIA;
- 4) Final public consultation;
- 5) Validation and adoption of the updated SRIA during the 11th Governing Board Meeting.

Through this updating procedure, JPI Climate members revised research priorities thanks to the inputs of the broader stakeholder community involved in climate research and services. As stated above (see Section 2.1), research priorities were designed to be *challenge-driven* instead of *discipline-oriented*, as it was the case of the first SRA, and to promote a more integrative and user-oriented research approach.

1) Formation of a Task Force in charge of steering the updating process

During JPI Climate’s ninth Governing Board meeting, Governing Board members mandated the revision of JPI Climate’s Strategic Research Agenda and approved the formation of a Task Force in charge of facilitating this process. The Task Force consisted of six Governing Board members and was the temporary decision-making body regarding the definition of the SRA updating methodology, process and timeframe.¹⁵⁸ It was supported by JPI Climate’s Central Secretariat.

2) Internal consultation among members of main JPI Climate governing bodies

A first Kick-Off Meeting was organised by the Task Force for the SRA update with the Transdisciplinary Advisory Board, which involves academics and representatives of relevant stakeholder groups. This meeting allowed to discuss how the Transdisciplinary Advisory Board should be involved in the updating process and to make initial decisions on the latter.¹⁵⁹

A first draft of the revised SRA was elaborated by the Task Force by extracting the strategic elements of JPI Climate’s first SRA. It was then submitted to members of various JPI Climate bodies, i.e. Working Groups, the Management Committee, the Transdisciplinary Advisory Board and the Governing Board. The comments provided through this initial internal consultation were collected by the Central Secretariat and discussed during a workshop that brought together all governing bodies mentioned above. Comments were integrated by a Writing Group consisting of three GB members of the Task Force into a second draft, which was then submitted once more to the same bodies that had commented on the first draft. The third draft reflected these last inputs.¹⁶⁰

¹⁵⁶ JPI Climate – Strategic Research & Innovation Agenda, 2016-2025

¹⁵⁷ Presentation of the draft updated SRA (JPI Climate Symposium November 2015)

¹⁵⁸ JPI Climate Newsletter Issue 5 (September 2015)

¹⁵⁹ Kick-off Meeting of the Task Force for the update of the Strategic Research Agenda (SRA), July 8th and 9th, 2015, Paris

¹⁶⁰ Strategic Research Agenda (SRA) update – Proposed Roadmap (2015)

3) Stocktaking event involving stakeholders in order to have their point of view on the updated SRIA

The JPI Climate Symposium “Taking stock and inspiring the future” provided the opportunity to present and discuss the future of JPI Climate’s strategy orientation and implementation with participating stakeholders. In particular, the four research challenges listed in the third draft of JPI Climate’s SRIA were each discussed in four separate discussion groups. Main results were collected on flip charts and a voting system was put in place in order to obtain a representative view of the participants’ inputs.¹⁶¹

After the stocktaking event, the third draft of the Strategic Research and Innovation Agenda was presented during the 10th Governing Board Meeting and contributions provided thanks to the JPI Climate Symposium were discussed. A fourth draft was then elaborated in order to integrate the recommendations of Governing Board members.¹⁶²

4) Final public consultation

The Task Force in charge of the SRA updating launched a public consultation in order to seek the feedback of the broader JPI Climate community on the fourth draft, including relevant research and stakeholder communities (e.g. Research Performing Organisations involved in JPI Climate activities, other related JPIs, European non-member countries, international programmes, etc.). A targeted approach was adopted by (i) clearly defining the requested input through a questionnaire and (ii) identifying and reaching out to a relevant audience by sending out invitations to specific stakeholders and experts. In addition, the SRA draft was publically available for consultation on the JPI Climate website.¹⁶³

The Central Secretariat was in charge of collecting and clustering received inputs into a response database. After the closing of the consultation, a two-day “Digestion Session” took place in order to discuss the 47 responses received. This session brought together the Task Force, including the Chair of the Transdisciplinary Advisory Board, the Management Committee and the Central Secretariat. The nature of participants of the consultation was considered as inclusive, as it involved a wide range of organisations and initiatives in addition to individual responses, thus ensuring a good balance in terms of sectors, country location and knowledge area.¹⁶⁴ The analysis of received contributions enabled to categorise the latter into three different groups and discuss how to address them: 1) Suggestions on specific topics, research needs and actions that could be included under the proposed strategic objectives, 2) Comments that call for clarification of the content (or structure), and 3) Suggestions related to further development of the strategic directions of JPI Climate. The Digestion Session was completed with a meeting involving the Task Force only, during which decisions were made on the SRA update and particularly on the integration of categorised contributions in the SRA. In particular, it is at this stage that the Task Force decided to integrate the strategic focus on innovation into the title of the document and hence to propose the adoption of a “Strategic Research and Innovation Agenda” (i.e. not only a “Strategic Research Agenda”). Overall modifications of the new SRIA in relationship to the answers received were presented and explained in writing to participants of the consultation.¹⁶⁵

5) Validation and adoption of the updated SRIA during 11th Governing Board Meeting

The final step of this updating process consisted in the elaboration of a fifth draft resulting from the analysis of the public consultation inputs. This last draft was then presented and approved by all JPI Climate Governing Board members during the 11th Governing Board Meeting.¹⁶⁶

2.3 Governance structure

The governance model that had been initially adopted by JPI Climate members relies on the definition of several governing bodies that interact with each other. In particular, the Governing Board (GB) is the main decision-making body regarding strategic orientations and consists of representatives of participating national funding

¹⁶¹ Short report on JPI Symposium “Taking stock and inspiring the future” (November 2015)

¹⁶² JPI Climate Newsletter Issue 6 (December 2015)

¹⁶³ JPI Climate Strategic Research Agenda – Consultations: A Concept Note (2015)

¹⁶⁴ SRA Consultation - digestion of the inputs received by the Central Secretariat (2016)

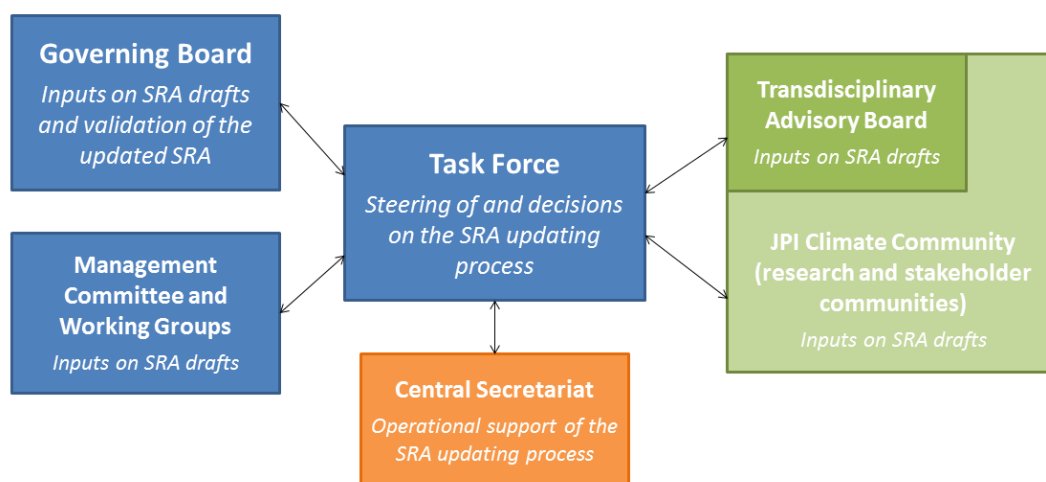
¹⁶⁵ Updated Strategic Research Agenda, 2016-2025: Response to the public consultation (April 2016)

¹⁶⁶ State of play of consultation process – next steps (2016)

organisations. Governing Board members can be appointed to jointly implement JPI Climate activities within Working Groups (WGs) and can also mandate national researchers to participate in these working groups. The Management Committee (MC) oversees the coordination and operational management of Working Groups and is in charge of maintaining the information flow between Working Groups and the Governing Board. It consists of spokespersons from each Working Group. The Transdisciplinary Advisory Board (TAB) advises the Governing Board and consists of relevant academic and non-academic stakeholders and experts. Lastly, the Central Secretariat (CS) provides support in the day-to-day coordination and management of all governing bodies mentioned above.¹⁶⁷

As explained in Section 2.2, a dedicated Task Force (TF) was established temporarily in order to steer the SRA updating process. The distribution of related responsibilities was clearly defined among JPI Climate's governing bodies (see Fig. 1 below).

Figure 1. Allocation of responsibilities for the updating of JPI Climate's Strategic Research Agenda



Source: Own compilation

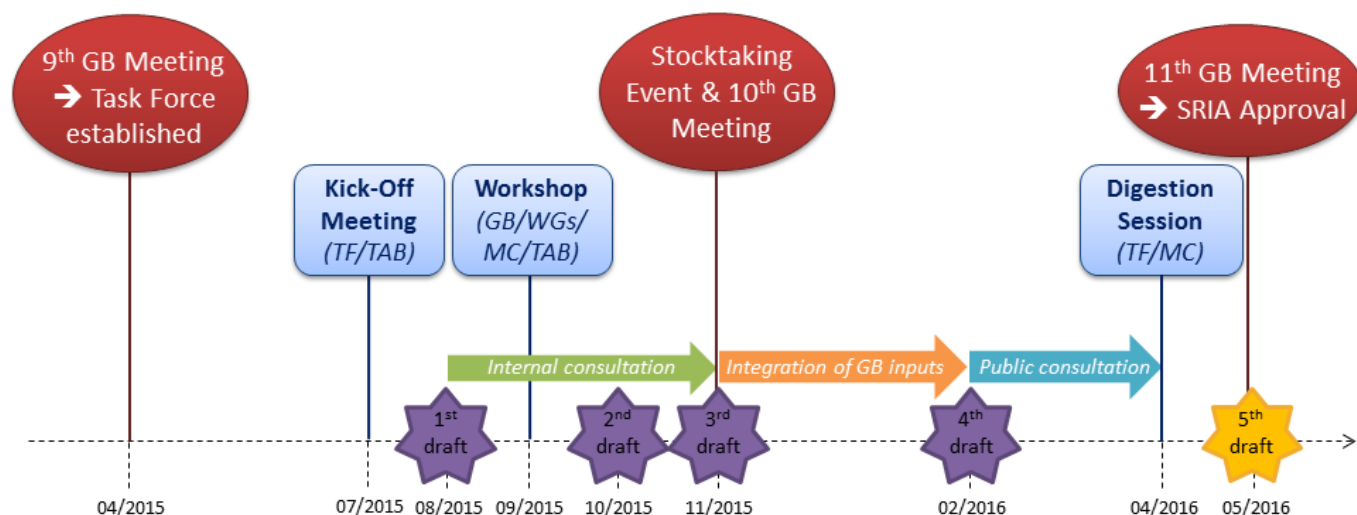
The adoption of a new SRIA has triggered the revision of JPI Climate's governance model in order to effectively implement this SRIA. The new governance model is in the process of being approved and will be made official in the near future.

2.4 Approximate resources and time needed for implementation

Required human resources were provided both by the Task Force and the Central Secretariat. The Task Force was composed of six GB members as well as the TAB Chair and a member of a JPI Working Group (see Section 2.3), amounting to an equivalent of 8 Person-Months. The operational support provided by the Central Secretariat represented a total of 4 PM. The revision of JPI Climate's SRA was **entirely funded by JPI member countries**. Indeed, the participation of GB members in the Task Force represented a direct in-kind contribution while the Central Secretariat was financed via the latter's own budget, which consists of JPI full members' fees that feed into a real common pot. The timeline presented in Figure 2 below indicates that approximately 12 months were required in order to carry out the updating process of JPI Climate's SRIA.

¹⁶⁷ <http://www.jpi-climate.eu/programme/governance>

Figure 2. Allocation of responsibilities for the updating of JPI Climate's Strategic Research Agenda



Source: Own compilation

3. Overall strengths of this approach, including key achievements

The revision of JPI Climate's Strategic Research Agenda was conducted in order to enhance strategic alignment among the research strategies and activities of JPI member countries, and particularly to integrate lessons learned from the first SRA and take account of recent societal changes related to climate change issues. It relied on an inclusive approach that aimed to foster ownership by Governing Board members, prioritise strategic objectives, and provide an integrative document that supports better outreach to stakeholder communities.

3.1 Strong member-country ownership and leadership for enhanced strategic alignment

A Strategic Research (and Innovation) Agenda is an essential joint output that expresses the collective agreement between involved countries on future transnational research strategies. Its elaboration addresses the major challenge of delimiting the scope for transnational research cooperation, aligning national research priorities within that scope at strategic/policy level in order to develop common ones, and prioritising the latter. The SRA/SRIA is the required base for further cooperation and alignment at operational and financial levels (i.e. through the joint implementation of transnational research activities).

Therefore, JPI Climate's coordination team aimed to foster high involvement and leadership of member countries in the SRIA elaboration process and strong ownership of its outcomes (i.e. content of the SRIA) in order to ensure their long-term engagement in and support of JPI activities. This was greatly supported thanks to the formation of a Task Force in charge of steering the SRA updating process and writing the document (see Section 2.2). Indeed, **this Task Force mainly consisted of Governing Board members**, which gave the leadership on the new SRIA's content to funders and not to researchers. Moreover, this ensured an efficient communication loop in between Governing Board meetings between Task Force members and other GB members that were not part of the Task Force, which fostered **trust-building amongst and ownership by all GB members**. In particular, close interaction with the Governing Board was especially valuable in order to collectively discuss and validate SRIA drafts. The efficient operation of the Task Force hence required competent, reliable, open-minded people with a strong sense of **leadership and inclusiveness**.

As a result, JPI Climate's approach allowed to produce a bold document that strongly engages all members and that they can all identify with (see Section 3.2). In addition, this process not only facilitated the joint elaboration of a Strategic Research and Innovation Agenda, but also **contributed to strengthening the JPI main decision-making body (i.e. Governing Board) as a whole**.

3.2 Common prioritised strategic objectives

Through their new SRIA, JPI Climate members have aimed to **demonstrate a strong continuity** between what has been achieved by JPI Climate and in the climate research area in general and what will be supported in the future, and more broadly to take account of past and potential future evolutions of society at large. This is why they

strongly built upon the first SRA, which they considered as still relevant and of high value, and **developed a long-term vision** (i.e. over 10 years) that implicitly integrates JPI Climate's past and future activities.

However, in contrast to JPI Climate's first SRA, JPI members sought a more **strategic document** that would effectively support their visionary approach. Indeed, the first SRA consisted in a mix between strategic and implementation aspects, hence missing a strong strategic focus and a prioritisation of objectives. Thus, the first step of the SRA revision consisted in filtering the strategic elements of the first SRA and leaving out all implementation issues. This allowed member countries to then elaborate on the rationale for the existence of JPI Climate, their common vision, the overall mission of JPI Climate and related strategic objectives, and its added value at European and international level. As a result, the updated SRIA does not refer to specific research fields and potential joint research actions, as opposed to the first SRA. Indeed, this will be the focus of more operational documents (e.g. Implementation Plan).

In addition, the **format of the new SRIA** is much shorter (i.e. around ten pages long) compared to the first one and is similar to a narrative. Hence, the resulting SRIA can be disseminated more easily and its key messages have a more effective impact on readers.

3.3 An integrative and collaborative approach and agenda

The elaboration of JPI Climate's first SRA was affected by low interaction between the different Working Groups (see Section 2.3), which were each responsible for the development of joint research activities on a specific research question that had been identified in the SRA. This was mainly due to the latter's discipline-oriented content, which was divided into research modules and sub-research topics. Thus, the updating of JPI Climate's SRA allowed an **integration of strategic objectives** by going beyond a disciplinary approach and relying on a cross-cutting and challenge-driven one. In particular, JPI Climate members consciously avoided strict scientific scoping of objectives in order to contribute to reducing fragmentation of a systemic issue such as climate change. This was reflected in the **writing process** as a small group of funders (i.e. Task Force) was drafting the document as a whole, as opposed to the elaboration of the first SRA where several groups of researchers were each in charge of writing a specific section.

Moreover, in order to achieve the desired integrated nature of JPI Climate's SRIA, the latter's elaboration required a **collaborative approach** that enabled the involvement of academic and non-academic stakeholders. This was for instance facilitated through the participation of the Chair of the Transdisciplinary Advisory Board (see Section 2.3) in the Task Force. Indeed, he ensured the link between TAB and TF/GB members. In addition, the stocktaking event and the final public consultation (see Section 2.2) also gave stakeholders the opportunity to give their feedback on earlier drafts of the updated SRIA. As a result, the latter is more **stakeholder-oriented** than the previous one and expresses the desire to have a better outreach to stakeholder communities related to JPI Climate, particularly as interactions between funders and researchers had been limited so far. Thanks to the collaborative nature of the SRIA elaboration process, JPI Climate has already benefited from strengthened relations with stakeholder communities. This goal is to be further developed through the **revision of the JPI governance model** in line with the new SRIA for the latter's effective implementation (see Section 2.3). In particular, the revised governance structure will seek to better connect JPI Climate to related research communities.

4. Overall limitations with this approach, including difficulties encountered during implementation

Several challenges can be encountered while elaborating or updating a Strategic Research and Innovation Agenda, in particular regarding the operation of the procedure and the involvement of key players. JPI Climate's approach has allowed to address these potential difficulties successfully.

4.1 Time-consuming and complex procedure

The elaboration of JPI Climate's SRIA was a long procedure which involved a large number of people and aimed to identify joint research strategies related to the broad and interdisciplinary issue of climate change. In order to effectively facilitate this procedure, Task Force members have ensured the **manageability of its operation**.

In particular, they elaborated a well-defined roadmap and timeframe, which was revised when needed and then communicated to all involved key players. Also, relying on a small group of persons in charge of actually writing

the SRIA revealed itself as very time-efficient and fruitful, as opposed to the first SRA writing process which had involved approximately 50 people. The writing approach adopted for the SRA revision hence allowed for efficient decision-making and improved prioritisation and integration of members' joint strategic objectives (see Sections 3.2 and 3.3). The Task Force benefited from a significant day-to-day operational support of the Central Secretariat. In general, the distribution of roles amongst governing bodies was clearly defined and the facilitated interaction between the latter (e.g. via the Kick-Off Meeting, the workshop and Digestion Session) ensured an effective information flow, also contributing to enhancing the collaborative nature of the process as explained above (see Section 3.3). Lastly, efficient outreach to stakeholder communities and integration of their inputs required a targeted approach, especially when conducting the final public consultation (see Section 2.2).

4.2 *Challenge to optimally involve all key players in the elaboration process*

When developing a stakeholder-oriented SRIA, ensuring that all relevant stakeholder communities feel integrated in the process and taking into account their various requirements and points of views on future transnational research strategies is a significant challenge. In JPI Climate's case, some researchers had for instance difficulties in understanding how they could provide relevant feedback on the content of the SRIA during the final public consultation. Indeed, scientists are specialised in a specific field of research, which is why some initially may have assumed they would be asked to contribute to a particular section of the SRIA that related to their discipline. As JPI members aimed to avoid a disciplinary approach and to elaborate a very strategic document with integrated broad goals, the public consultation was conducted in order to seek feedback on the strategy as a whole. Specific disciplinary issues are to be addressed when designing and implementing targeted joint research actions.

4.3 *Appropriate resources needed to effectively support the elaboration process*

As indicated in Section 2.4, appropriate human and financial resources were provided by member countries for the elaboration of JPI Climate's new SRIA. In particular, the support from the Central Secretariat allowed to formalise and facilitate the design of the updating process as well as to monitor its operation. In contrast, the initial set-up of JPI Climate in 2010-2011 did not rely on such a formalised approach. Indeed, the development of the JPI's membership and governance and the elaboration of its first SRA consisted in an informal process that relied on in-kind resources from potential JPI members based on the latters' voluntary engagement. The set-up of a real common pot to fund a supporting structure (i.e. Central Secretariat) that facilitated the revision of JPI Climate's SRA was hence beneficial for this process. However, the direct involvement of partner countries through strong participation of national representatives is of course at the core of the joint elaboration of common strategic research priorities.

5. Conclusions: Suitability and key factors of success

The Strategic Research (and Innovation) Agenda is the output that expresses the collective agreement between countries involved in a P2P initiative (e.g. JPI) on future long-term transnational research priorities and strategies. Its elaboration is therefore **key for the alignment of national research programmes at strategic level**, which is why it is especially **required at the beginning of any type of joint programming initiative** that focuses on a **broad interdisciplinary research area** for which transnational cooperation is relevant. Moreover, updating an SRA/SRIA can be required, particularly in order to take account of major societal or policy shifts. Developing an SRA usually relies on outcomes from previous foresight and mapping activities, and/or on the content of a former SRA in the case of an update. The resulting Strategic Research (and Innovation) Agenda is essential to influence the level of associated financial and operational alignment amongst JPI/P2P member countries, if subsequently accompanied by an ambitious Implementation Plan.

Key factors of success:

1) At strategic level:

- **Jointly develop a common long-term vision that relies on a strong sense of trust, inclusiveness of and ownership by all members** by empowering them in leading the SRA elaboration process: this greatly contributes to ensuring long-term involvement in and financial/operational support of implemented joint research activities and of the initiative as a whole.
- **Collectively agree on joint strategic objectives that rely on an integrative approach, especially** if dealing with a research area that focuses on a broad systemic issue: this allows to avoid further fragmentation of research activities, which can especially hinder progress in addressing grand societal challenges, and it does not cut out the possibility of carrying out research activities related to a specific discipline if the latter is required.
- **Jointly build a governance model that can effectively support the implementation of SRA objectives:** if possible, this should be carried out in parallel with or right after the SRA elaboration in order to start the implementation process as soon as the SRA is adopted. The development of SRA should ideally be followed by the elaboration of a more practical joint Implementation Plan that would help translate some of the SRA's ambitions in practice by outlining joint research and innovation actions to be carried forward.

2) At financial level:

- **Secure sufficient resources** in terms of funding support (i.e. at national levels and/or via EC co-funding) and time required from members to effectively design and steer the SRA elaboration process: this can also include funding for pre-requisite activities such as joint mapping and foresight.

3) At operational level:

- **Collectively agree on a relevant SRA format** in terms of content and nature (strategic vs. research-related) as well as style of writing and length: for instance, elaborating a short SRA allows to disseminate it more easily and ensure a more effective impact of its content.
- **Jointly agree on responsibilities among P2P governing bodies and ensure an effective communication flow between them** in order to involve the P2P structure as a whole: in particular, appointing a small group of members in charge of leading the SRA elaboration process ensures efficient writing of the SRA and relying on a team responsible for the day-to-day monitoring of the process (e.g. JPI Secretariat) is required.
- **Collaborate with relevant stakeholders and seek their inputs in a targeted way** in order to efficiently integrate the contributions of diverse stakeholder communities and provide a stakeholder-oriented SRA that stakeholders can identify with.

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Interview

Alexandre Fernandes: JPI Climate Secretariat

Petra Manderscheid: Executive Director, JPI Climate Secretariat

ANNEX 1. JOINT PROGRAMMING INITIATIVE “CONNECTING CLIMATE KNOWLEDGE FOR EUROPE”

JPI Climate is a European Joint Programming Initiative of EU Member States and Associated Countries, in cooperation with the European Commission. JPI Climate, comprised of representatives of ministries and organisations for research funding, aims through its programme of activities to connect research, performers and funders across Europe to promote the creation of new knowledge in the natural and anthropogenic climate change domain that is fundamental and relevant for decision support.¹⁶⁸

Overall, JPI Climate:

- aims to respond to the knowledge needs of policy and the European society at large to address climate change;
- provides a platform to align national research priorities according to a jointly agreed Strategic Research and Innovation Agenda (SRIA) with the aim of complementing and supporting initiatives at the European level (ERA-NETs, Horizon 2020, Climate KIC, ESFRI Projects, Copernicus);
- facilitates the coordination, collaboration and exploitation of synergies in climate change research, learning and innovation while working against fragmentation and duplication of efforts;
- connects different disciplinary approaches in natural and social sciences leading to interdisciplinary research efforts of higher quality and relevance;
- connects top researchers and research groups from different European countries, leading to high quality and efficient research efforts, long term collaborations and a stronger global position;
- connects scientific insights with the demands of policy makers, decision makers and other stakeholders from local to international levels, leading to more effective policies.¹⁶⁹

JPI CLIMATE VISION: *To actively inform and enable the transition to a low emission, climate resilient economy, society and environment that is aligned with Europe’s long-term climate policy objectives; To develop and coordinate a pan-European research programming platform to provide useful climate knowledge and services for European and national climate strategies and plans and contributions to the UNFCCC and the UN Sustainable Development Goals.*

JPI CLIMATE MISSION: *To align and inform strategies, instruments, resources and actors at national and European levels by connecting the various research communities with research funders and performing organisations, within and across European countries, and beyond Europe.*¹⁷⁰

JPI CLIMATE IMPLEMENTATION PROCESS:

As a tool for alignment of research between the member countries, JPI Climate has implemented some of the priorities identified in its Strategic Research and Innovation Agenda through a set of Joint Transnational Calls. To-date, there have been three calls:

- 1) 2013 - Call for Transnational Collaborative Research Projects;
- 2) 2015 - Call for Climate Services Collaborative Research action on Climate Predictability and Inter-regional Linkages (together with the Belmont Forum);
- 3) 2016 - ERA4CS Joint Call on Researching and Advancing Climate Services Development.¹⁷¹

¹⁶⁸ JPI Climate SRIA 2016-2025

¹⁶⁹ <http://www.jpi-climate.eu/programme/about-JPI-Climate>

¹⁷⁰ JPI Climate SRIA 2016-2025

¹⁷¹ <http://www.jpi-climate.eu/joint-activities/joint-calls>

ANNEX 2. JPI CLIMATE'S FIRST STRATEGIC RESEARCH AGENDA (2011-2015)¹⁷²

JPI Climate's first SRA sets out policy-relevant research priorities for the short, medium and long-term on climate in Europe. This dynamic and flexible agenda (2011-2015) focuses on four interconnected work modules. Taken together, the modules represent the priority research areas identified by academics and stakeholders in participating countries where evidence and knowledge is needed to respond to current practitioner needs.

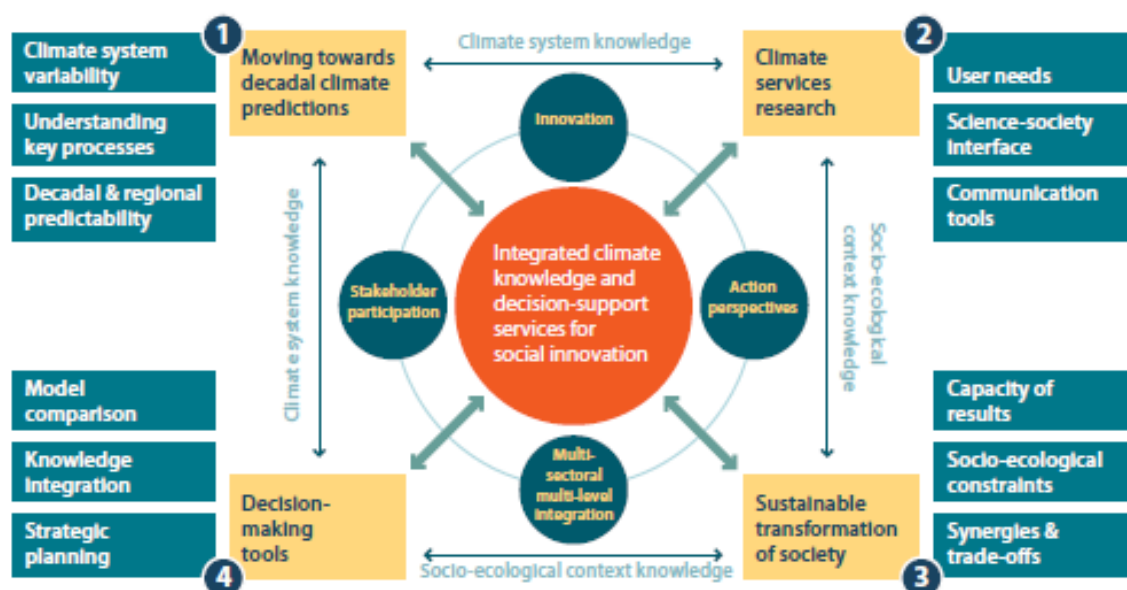
The four modules are complementary and synergistic, with established connections to other areas of research delivered by national and international programmes. By aligning with external activities in both the short-term and longer-term, JPI Climate adds value to total investments and helps deliver the integrated decision support needed by policy and practice.

Module 1. Moving towards reliable decadal climate predictions: this first module focuses on the implementation and coordination of climate modelling and observation activities across Europe in order to advance scientific knowledge on the climate system and provide reliable climate predictions through enhanced research capacity building and easier access to models and data.

Module 2. Researching and advancing climate services development: this second module describes JPI Climate's aim to facilitate the dissemination of climate knowledge and services among end-users such as policy-makers and businesses, and to develop their application to local needs.

Module 3. Sustainable transformations of society in the face of climate change: the SRA's third module focuses on the need to develop potential socio-economic responses to climate change, identify the drivers of these changes and facilitate their implementation.

Module 4. Improving tools for decision-making under climate change: the last module focuses on JPI Climate's aim to facilitate the integration of climate change risks and uncertainties in socio-economic scenarios and decision-making tools, especially regarding strategic, policy and investment decisions.



¹⁷² JPI Climate Strategic Research Agenda 2011-2015 (Summary)

ANNEX 3. JPI CLIMATE'S UPDATED STRATEGIC RESEARCH AND INNOVATION AGENDA (2016-2025)¹⁷³

JPI Climate's updated Strategic Research and Innovation Agenda (SRIA) sets out three overarching challenges and one strategic mechanism that together are intended to develop and support excellent, innovative, relevant and informative climate research. The framing – especially the emphasis on connectivity and synergy - reflects the priorities and approaches of researchers, funders and practitioners in the countries participating in JPI Climate.

The three overarching challenges are:

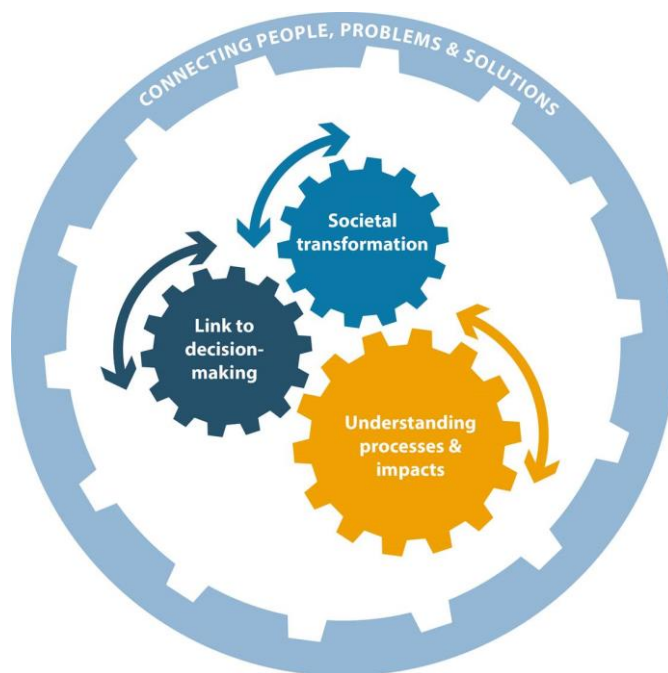
- 1. Understanding the processes and consequences of climate change**
- 2. Improving knowledge on climate-related decision-making processes and measures**
- 3. Researching sustainable societal transformation in the context of climate change**

and the Strategic Mechanism is:

Connecting people, problems and solutions in a systemic approach

The first challenge deals with building the knowledge base on the climate system and climate impacts that is relevant for strategic planning. While the second challenge deals with the short-term/incremental decisions and understanding decision making processes themselves, the third challenge deals with decisions in a wider and more holistic perspective, in terms of the long-term transition and development of society. Together these three challenges deal with linking research and innovation to decisions at different scales.

The strategic mechanism frames the task of JPI Climate of enhancing connections as a research topic in itself. JPI Climate aims to work in an international context for all of these three challenges and strategic mechanism that comprise its SRIA, with a user-oriented approach and with a focus on integrating research and decision making.



In addition, the SRIA highlights how JPI climate can effectively contribute to the European Research Area. Indeed, JPI Climate aims to foster the development of coherent research activities across its membership whilst maintaining creative diversity. It aims to facilitate cross-border interactions and enable a broader level of research and innovation. JPI Climate will help ensure maximum impact from European research efforts to respond to information and analysis needs that arise from the challenge of climate variability and change. In terms of process it will specifically contribute to:

¹⁷³ JPI Climate Strategic Research Agenda 2016-2025

1. Enhanced societal relevance. JPI Climate's multi-, inter-, and trans-disciplinary nature will consolidate, strengthen and amplify current climate research and its impacts, delivering usable knowledge for decision support at all levels across public, private or community sectors.

2. Enhanced cooperation and alignment of research. Intensified cooperation between researchers from different countries, scientific traditions, disciplines and perspectives enhances innovation and scientific quality. Enhanced alignment of research should improve the efficiency and utility of research investments, including human resources and capacity.

3. Long-term continuity. An international collaborative joint programming initiative over decades can transcend the limitations of short-term research programmes and projects, and provide more stability and continuity in research collaboration, essential considering the challenges society is facing.

4. Higher effectiveness. Transnational research collaboration avoids fragmentation and duplication of research, takes advantage of diversity and cultures, and can use resources more effectively, through national alignment or transnational support, by sharing and jointly developing new data from observational networks and modelling, experiments, tools, methods and research infrastructures.

5. Stronger global position. A well-coordinated JPI Climate will provide a competitive edge in the global climate change science arena. By providing strong science support, it can also foster Europe's role in international climate policy development and enhance North-South research collaboration.

ANNEX 1. NATIONAL OPEN ACCESS POLICIES AND INFRASTRUCTURES DEVELOPED UNDER OPENAIREPLUS¹⁷⁴

<i>Country</i>	<i>Advancements in Policy</i>	<i>Infrastructure Developments</i>
Austria	Major research funder, FWF now has an OA policy for all funded projects	OpenAIRE compliant e-Infrastructures Austria sponsored by Federal Ministry of Science, Research and Economy
Belgium	Installation of an OA working group. The representative from the federal government is also the point of reference to the EC for OA	
Bulgaria	Commission for implementation of an OA plan	National OpenAIRE compliant repository of FP7 publications
Croatia	The new Law of Science and Higher education has a mandate for OA ETDs	A national OpenAIRE compliant repository infrastructure is being set up
Cyprus		All public universities developed OA repositories OpenAIRE compliant
Czech Republic	R&D council released Recommendations on OA, in-line with the EC	OpenAIRE compliant repositories
Estonia	The Research and Innovation Policy Monitoring Program of the Estonian Ministry of Education & Research - analysing current OA trends and providing suggestions on national OA policy, in-line with the EC	
Finland	NOAD liaison with Open Science and Research Initiative (ATT), 2014-2017 by the Finnish Ministry of Education and Culture to follow OA demands of the EC	
Germany	Research Administrators nation-wide very engaged with take up of EC OA mandate	
Greece	Increased awareness of OA among major stakeholders and policy makers	Its emerging national infrastructure is being OpenAIRE compliant
Hungary	HUNOR, association of Hungarian OA repositories promotes repository development	
Italy	Ministry of Education: OA mandate for publications and data, aligned with EC	IRIS information system, similar to CRIS
Latvia	OA policy drafted by major university, presented to the ministry	90% of FP7 publications integrated into repository
Lithuania	Support from research councils for OA: setting policy principles	National OpenAIRE compliant repository, eLABa

¹⁷⁴ OpenAIREplus Executive Report (2015)

Luxembourg		First repository established, OpenAIRE compliant
Malta		University established first institutional repository
Netherlands	Ministry of Education, Culture and Science committed to OA as of 2014	
Poland	Cooperation with Conference of Rectors of Academic Schools and Ministry of Science to initiate work on policy changes	Development of free repository package: Polish version of DSpace; 383% increase in number of OA repositories
Portugal	Major research funder releases OA policy, in line with the EC	RCAAP - OpenAIRE compliant infrastructure in place
Romania	National Strategy for Innovation sets OA for all results. Part of Open Government Partnership	
Slovakia	Government plan for OA mandate. Part of Open Government Partnership	
Slovenia	Ministry for Science, Education and Sport set up a Working Group to develop an OA policy, in line with the EC	Establishment of national OA infrastructure and a national open science portal
Spain	R&D funded projects mirror EC OA mandate	High rate of repositories are compliant
Sweden	The Swedish Research Council has been tasked by the Government to produce national guidelines for open access to scientific information	
Switzerland	Swiss Science Foundation extends OA policy to monographs	
Turkey	Council of Higher Education has started an OA project	Established many new OpenAIRE compliant repositories