SWOT analysis of alignment modalities

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Executive Summary

This report is Deliverable 4.4 of the ERA-LEARN 2020 project. It is an analysis of 23 case studies[1] that were elaborated in relation to alignment of national strategies and programmes within the P2P community but also beyond. The analysis refers to the strengths and weaknesses of the alignment modalities and addresses opportunities and threats stemming from the discussions about the future of P2Ps. It draws on the specific case studies elaborated and relevant publications including academic papers, policy reports, strategic documents, and position papers. Together with the other ERA-LEARN 2020 reports addressing the issue of alignment[2], this report responds to the need to establish a clear mutual understanding of what alignment means and explore possible good practices for overcoming obstacles and challenges to increasing alignment across national strategies and programmes.

Adopting the definition of the High Level Group for Joint Programming (GPC), alignment has been identified as a prerequisite of successful joint programming activities for a number of reasons. The degree of alignment achieved across national strategies and systems frames the extent to which it is possible to establish European level structures (such as P2Ps) with clear identity. The challenges currently addressed by the EU research and innovation policy are truly global in nature and require sophisticated or costly infrastructures, and significant capacities and resources that may not be found within a single country. Better alignment of research policy agendas leads to more effective trans-border cooperation and creation of the necessary critical mass to tackle such challenges.

Three different levels of alignment can be distinguished for analytical purposes, i.e. the strategic, the operational and the financial level. Each of these levels present specific challenges. The case studies selected and reviewed offer possible solutions.

The strategic level includes processes that enable the identification of areas of mutual interest in view of trans-national collaboration. Identifying priority areas is a hard task at the national level as it needs to include different types of stakeholders with diverse viewpoints and vested interests. Naturally, this task becomes even harder at the trans-national level where different and even conflicting views need to be converged. The so called 'fair-return' approaches in decision-making may not be the most appropriate in addressing global challenges and the 'variable geometry' principle may not be the right framework to encourage less research-intensive countries to have an equal role in this process. Adding to these challenges, national research systems present differences at various levels (financial support, types of funding, actors and institutions, accountability and evaluation systems).

The development of common research agendas is not a trivial task. It needs to be an inclusive and transparent process that produces consensus out of a diverse set of motivations, expectations, and national positions. The inability of involved parties to reach an agreement

[1] cf. https://www.era-learn.eu/alignment

[2] namely the ERA-LEARN 2020 Report on the definition and typology of alignment, the ERA-LEARN 2020 Toolbox of current and novel alignment modalities and instruments and the synthesis reports of the case studies found under https://www.era-learn.eu/alignment.

consists the higher risk of failure before the actual start of a collaborative project. The Joint mapping exercise that was carried out under FACCE-JPI is an example of a first alignment activity aimed at building trust among the involved countries. The experience of JPI Climate in updating its SRIA also provides useful advice on how to organise an open, transparent and inclusive process. From outside the P2P community, the BLUEMED initiative offers another example of a well-organised and inclusive process of developing a strategic research and innovation agenda without the support of a formalised structure (such as a central secretariat). Another good practice case is the Vanguard Initiative that identified common ground for collaboration based on smart specialisation priorities of different regions and focusing in specific industrial sectors.

Achieving alignment of national strategies and programmes at the trans-national level first needs coordination between the different actors at the national level (ministries, funding agencies, etc.). Such coordination is not always present and needs to be built or further improved. Austria offers a good example of national coordination in order to maximise impact from P2P participation.

At the operational level, P2P partnerships need to overcome challenges in relation to agreeing on call topics, implementing and managing calls, and defining funding and reporting procedures. P2Ps have to build compatibility between different timings and procedures that exist at the national level, some of which require legislative action to change. Nordforsk and the European Metrology Research programme (EMRP, the predecessor of EMPIR) offer good processes for defining call topics, while the example of the Austrian programme BENEFIT shows how a national programme can be aligned to its trans-national counterpart under the AAL Art 185 initiative.

Common procedures for evaluation and reporting are easier to define for P2Ps that are supported by the European Commission, as they have to follow pre-defined procedures and rules. On the other hand, the DACH Agreement is a showcase of the Lead Agency Procedure where specific tasks are delegated to one of the partner organisations that follows its internal rules and procedures with the acceptance of the rest of the partners. The same approach is followed in the case of the ERA-NET HERA in managing the funding aspects of the call.

The funding of projects needs special attention as it might cause significant delays or even cancellation of approved projects. In BONUS for instance due to the separate national funding streams, beneficiaries must have agreements and receive payments from both BONUS EEIG and their respective national funding agencies. Double reporting, i.e. both to the national funding agency and the partnership's secretariat, as in the case of ECSEL and BENEFIT, is a common practice that may, however, be considered as an extra burden.

P2Ps undertake joint activities that are not restricted to implementation of joint calls. Joint activities may also include sharing of infrastructures, capacity building, and knowledge transfer activities. JPI Oceans offers an example of shared use of a German research vessel, which actually acted as a trust building activity before developing the strategic research agenda. The Central European Research Infrastructure Consortium (CERIC-ERIC) offers the sharing of a distributed research infrastructure on a longer-term basis. The New York University Center for Urban Science and Progress (CURSP) is an example of public-private research centre consisting

of academic, industry, and city government partners that demonstrates the possibility to create a research infrastructure by joint efforts of a variety of actors. The Open Access Infrastructure for Research in Europe (OpenAIRE) promotes open access to research outputs across 33 countries from Europe and beyond.

Examples of capacity building include the knowledge hub MACSUR that was developed by FACCE-JPI and replicated by several others JPIs, and the knowledge sharing and transfer activities organised by the European Energy Research Alliance (EERA). In engaging the end-users P2Ps present a variety of approaches. Although there are examples of P2Ps with strong end-user interaction, this dimension can be further improved through learning from public-private partnerships, such as the ECSEL Joint Undertaking.

A number of issues emerge in achieving financial alignment. Some of them relate to the specificities of the P2P types in question such as the concern to maximise the use of the EC contribution in EU co-funded P2Ps, or the possibility to provide both in-cash and in-kind contributions as in the case of EDCTP or the newly created ERA-PLANET and ERA4CS.

At the same time, there is a variety of funding models that can be applied in P2Ps, each with their own strengths and weaknesses. P2Ps such as the ERA-NET Plus Infravation or BONUS apply the real common pot approach that solves several issues such as the funding of the total number of successful applications. However, this is not the easiest model to apply as this funding mechanism can go against certain national or regional funding rules. In addition, there are other funding approaches of cross-border collaboration that may also prove useful in increasing financial alignment in P2Ps (e.g. the “Money follows Researcher” and the “Money follows Cooperation Line”, both promoted by Science Europe).

The future of P2Ps entails threats if the challenges facing alignment are not effectively tackled. The P2P community appreciates that further efforts are needed so as to build

- political commitment to the Joint Programming Process,
- a national R&I system that prioritises societal challenges,
- a dedicated national structure for P2P participation and national coordination,
- a dedicated national budget for participation in joint programming activities,
- flexible funding of participation in joint programming, and
- a coherent ERA landscape and overarching joint programming strategy.

On the other hand, the future offers a number of opportunities for enhancing and strengthening alignment of national strategies and programming in jointly dealing with societal challenges. Looking at how Europe might change in the next decades, the White Paper on the Future of Europe[3] stresses that the choice is ours to make: *either to be swept along by the emerging trends, or to embrace them and stick together to achieve more*. The GPC stresses that the JPIs have developed into strategic hubs/platforms going beyond the launching of joint calls and considers the achievements of the JPIs and the overall Joint Programing Process promising and a valuable contribution to the advancement of the ERA. National Action Plans and ERA Road-maps reflect the commitment of Member States although readiness to engage in P2Ps varies across different countries.

[3] https://ec.europa.eu/commission/white-paper-future-europe-reflections-and-scenarios-eu27_en

The deliberations for the next Framework Programme offer the opportunity to design and implement a multi-level approach to joint programming giving P2Ps a more strategic role both at the national and European level. The future form of support to public-public partnerships should be an adaptable scheme reflecting the level of ambition and commitment of participating states, the scale and scope of the area addressed, and the relevance to the objectives of the Framework Programme. This flexible approach offers different kinds of opportunities to P2Ps in terms of alignment. A 'softer' approach may be more relevant for new P2Ps or for existing P2Ps where more efforts are needed to build the necessary trust and commitment to move towards more ambitious endeavours. However, even in the less ambitious P2Ps some degree of alignment needs to be achieved so that the respective trust building activities bear results. On the other hand, the more ambitious partnership need to overcome the challenges identified in relation to alignment. Hopefully this report along with the Toolbox and the case studies' report delivered by ERA-LEARN 2020 will prove useful in this regard.

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1. Introduction

Back in 2012 the EC Communication "A Reinforced European Research Area Partnership for Excellence and Growth" (EC, 2012) stated that the strategic alignment of different sources of national and other funds at the EU level was too low to make a serious impression on big and complex challenges. Five years later, the Mutual Learning Exercise on "Alignment and Interoperability of National Research Programmes", examining the level of alignment of countries vis-à-vis certain factors[4] found that there are several good practices that the EU Member States can spread around to improve alignment in view of joint programming. (MLE, 2017a)

Yet, there is still a long way to go to fully exploit the potential of joint programming to effectively tackle the societal challenges addressed. The reasons for this are only partly due to differences between national funding rules and selection processes and limited budgets for research and innovation. They also relate to challenges in coordination of alignment processes.

To improve this there is a need to have both a clear mutual understanding of what alignment means, and to review current alignment modalities in existing P2Ps but also examples of good practice outside the P2P community that can prove useful for overcoming obstacles and challenges in increasing alignment across national strategies and programmes. This was the mandate of ERA-LEARN 2020 (work-package 4) that aimed to:

1. Define the concept of alignment and produce an alignment typology taking into consideration the different facets and levels of alignment (cf. ERA-LEARN 2020 Report on the definition and typology of alignment);
2. Assess current approaches and explore options to foster alignment (cf. ERA-LEARN 2020 Summary of case studies of current approaches, https://www.era-learn.eu/alignment/current-approaches);
3. Explore and assess 'novel' approaches to alignment (cf. https://www.era-learn.eu/alignment/novel-alignment-modalities,);
4. Investigate alignment possibilities at the regional and trans-regional level (cf. https://www.era-learn.eu/alignment/trans-regional-perspective);
5. Compare alignment modalities through a SWOT analysis.

The present report is the ERA-LEARN 2020 SWOT analysis of alignment modalities and corresponds to the fifth aim mentioned above. It is based on the analysis of 23 cases (cf. Table 1) that were identified and studied in detail prior to this analysis. These cases consist of:

[4] The factors included : political commitment to JPP, a national research & innovation system that prioritises societal challenges, dedicated budget for participation in JPP activities, lead ministry/agency with dedicated resources to enable effective participation and flexible funding instruments for participation in JPP, effective strategic decision making structures for JPPs, coordination between ministries across policy domains, mobilising financial resources for JPP activities, coordination between ministries and agencies, offering platforms for stakeholder involvement and measuring impacts and making them visible, communication within the JPP community, communication to impact on sectoral policy, communication to attract researchers, communication to reach out to end-users and other stakeholders and communication to build political support.

- nine alignment modalities/instruments that have been implemented in existing P2Ps,
- seven 'novel' modalities/instruments, i.e. that have only recently been implemented in existing P2Ps, or that have not yet been utilized by the P2P community at all, and
- seven modalities/instruments from trans-regional initiatives of research and innovation collaboration that might also prove useful for P2Ps although being other types of initiatives.[5]

The SWOT analysis builds on the collected knowledge and experiences by identifying the strengths and weaknesses of the various modalities in solving key obstacles and challenges to alignment. It builds on the individual case study reports as well as the ERA-LEARN 2020 Toolbox of current and novel alignment modalities. At the same time, it cites findings from relevant recent reports and publications. In this regard it provides a synthetic overview of the latest insights, lessons learnt and good practices in improving alignment under the framework of joint programming. It further discusses relevant opportunities and threats to alignment of strategies and programmes within possible scenarios of the future of P2Ps.

The main target audience for the report are policy-makers at the EU and national levels, as well as national research funding and research performing organisations. For those that are already involved in P2Ps the report can provide good practice examples that they can adjust and implement in their own networks. For those that are not part of P2Ps yet it can serve as preparatory warning on what issues to consider and possibly solve before they enter the P2P community so as to make the best of their participation in P2Ps.

[5] A list of the reviewed cases is included in Table 1.

2. Alignment: definitions and issues

What is alignment

In 2014, the European Research Area and Innovation Committee's High Level Group for Joint Programming ("Groupe de Programmation Conjointe" or GPC) published a report defining alignment as "*the strategic approach taken by [EU] Member States to modify their national programmes, priorities or activities as a consequence of the adoption of joint research priorities in the context of Joint Programming, with a view to implement changes to improve the efficiency of investment in research at the level of Member States and the European Research Area*." [6] In 2016, the GPC definition of 'alignment' was extended to include also innovation, apart from research, activities: "*alignment of national, regional and European strategies, programmes and activities for research and innovation with the strategic research and innovation agendas developed as the results of the JPP*" [7]

Why alignment?

Extending the organisation of research and innovation beyond national borders responds to the need to reconcile the tension between inherently global research fields and research spaces that are largely nationally organised. The success of such endeavours depends on the extent to which national research spaces are compatible or aligned with each other in terms of funding rules, organisational set-up for funding and for conducting research. The level of alignment between national research spaces and that of the emerging European research space is likely to affect the level of political support at national level. The issue of alignment of national research spaces becomes of crucial importance for public-to-public partnerships (P2Ps) as it frames the extent to which the establishment of European level structures (such as P2Ps) with clear identity is possible. (Nedeva, 2013)

The 2017 Issue papers for the High Level Group on "Maximising impact of EU research and innovation programmes"[8] explicitly states that better alignment of research policy agendas leads to more impact of EU investments with faster and more effective solutions when addressing challenges such as health, food, energy, transport, water, climate change and the circular economy. The challenges currently addressed by the EU research and innovation policy are truly global in nature and require sophisticated or costly infrastructures, and significant capacities and resources that may not be found within the limits of a single country. This calls for increasing trans-border cooperation or enlarging research networks in order to overcome existing fragmentation and limited national coordination. At the same time, trans-national research collaboration per se is perceived to provide added value in terms of high-quality research within the global scientific community and across disciplinary boundaries (Reale, et. al. 2013).

[6] ERAC-GPC 1305/1/14/REV1, 30 October 2014
[7] Revised mandate for GPC 6214/16 RECH 21, https://www.era-learn.eu/gpc/summary-conclusions-gpc-meetings/2016411GPCMandatest07309.en16.pdf
[8] https://ec.europa.eu/research/evaluations/pdf/hlg_issue_papers.pdf

The different levels of alignment

Drawing on the ERA-LEARN Report on the Definition and Typology of Alignment three major levels of alignment can be distinguished: strategic, operational and financial.

Strategic alignment

Strategic alignment refers to finding common interests for collaboration by trying to identify converging, complementing or overlapping areas across the different national strategies and programme foci. This can be achieved through activities such as

- joint foresight activities,
- adoption of a common strategic Implementation / Action Plan,
- conduct of joint stakeholder consultations
- cooperation between JPIs, and with other relevant initiatives

Operational alignment

Operational alignment refers to the whole chain of operationalisation of the jointly defined strategy i.e. design, implementation, evaluation of joint activities, and dissemination of results. In the context of a P2P, this may be carried out through actions like:

- establishment of an integrated joint research programme
- establishment of a (loose) network or association of research performing organisations
- establishment of a Research Alliance
- establishment of a virtual network of excellence
- set-up of a network of researchers
- coordination of scientific techniques and methodologies
- alignment of (ex-post) evaluation frameworks
- harmonised reporting
- shared use of existing national research infrastructures
- open access to national scientific research data
- coordinated or joint dissemination of scientific results, etc.

Financial alignment

Financial alignment refers to making timing of funding, participation and funding rules in the different national programmes compatible, so that a smooth start and implementation of joint projects and activities can be ensured. Financial alignment relates to actions like:

- synchronisation of national calls for research proposals
- organisation of joint transnational calls for research proposals

An overview of the case studies

In what follows is a matrix showing the different cases that were reviewed and the type of alignment for which they have to offer valuable insights and experience.

Table 1: Case studies and relevance to types of alignment

Case studies	Strategic alignment	Operational alignment	Financial alignment
Existing P2P cases that can be useful to other P2Ps			
1. MACSUR		x	
2. EMRP	x	x	x
3. ERA-NET PLUS INFRAVATION			x
4. HERA ERA-NET			x
5. JPI Ocean's Shared Research Vessel		x	
6. FACCE joint mapping	x		
7. OpenAIRE		x	
8. CoEN	x	x	
9. JPI Climate SRIA update	x		
'New' cases that can be useful to P2Ps			
1. EERA - Novel	x	x	
2. ERA PLANET - NOVEL	x	x	x
3. ERA4CS - NOVEL		x	x
4. Common national position on alignment - Austria	x		
5. Alignment of national AAL Programmes - Austria	x		
6. New York University CUSP		x	
7. ECSEL - Novel	x	x	x
Transregional cases that can be useful to P2Ps			
1. NordForsk	x	x	x
2. BONUS	x	x	x
3. EDCTP	x	x	x
4. CERIC		x	x
5. Vanguard	x	x	x
6. DACH		x	
7. BLUEMED	x		

3. Strategic Alignment

National research spaces present several differences, i.e. in the levels of financial support for research and innovation, in the types of funding provided (block or competition-based, institutional or project-based funding) as well as the accountability and evaluation systems to inform research funding decisions. (Whitley and Glaser, 2007) Adding to this, there are also the different motivations and expectations as well as the different national interests and priorities that have to be combined in an effort to enable trans-national research and innovation collaboration. Strong vested interests at national level are very common in transnational collaboration efforts, and are likely to build biases into deliberative processes. (OECD, 2012)

The design and creation of programmes for research and innovation is shaped through a complex process where diverse motivations, interests, and expectations of different stakeholders are negotiated. This is a political process involving power and influence and becomes more complex in the case of trans-national collaboration where several different national contexts need to co-exist. (Reale, et. al. 2013) Even in the case of the Nordic Research Collaboration - Nordforsk, that is enjoying long-lasting trust and collaboration among the five countries involved[9] it has been noted that national processes to define priorities are slightly different across countries and so are the timelines for defining them, the number of organisations involved and the binding conditions. The structures and institutional set ups of the national research systems are different also with respect to the degree to which innovation is seen as integral part of research policy.

In trans-national ventures for research and innovation there are differences in country participation and national budget allocation. This may reflect different levels of opening and internationalisation of national research policies or a different organisation of national funding structures. (Reale, et. al. 2013) In this regard the 'variable geometry' principle, i.e. any interested country is free to decide whether to participate and how much budget to contribute in trans-national collaboration networks, may be the right approach. However, this inevitably leads to maintaining or even widening existing gaps in research performance and capacities across countries. (OECD, 2012)

'Fair return' approaches (juste retour) are quite common in trans-national cooperation as they are a means for countries to ensure a 'fair return' on their investments. Yet, they may not be the most appropriate in dealing with grand challenges. These need significant resources and a sense of 'altruism' in working towards a common goal (OECD, 2012). In addition, although the global nature of the challenges addressed and the need for international collaboration is recognised by participating countries (ERA-LEARN 2020, 2015), stakeholders may still hold diverging views on approaches to solutions.

Within the framework briefly discussed above, agreeing on common strategies and priorities in dealing with societal challenges is not a trivial task. Nevertheless, certain solutions are offered by P2Ps albeit with their own strengths and weaknesses. These are discussed below.

[9] Denmark, Finland, Iceland, Norway and Sweden, and three autonomous areas, Faroe Islands, Greenland and the Åland Islands.

Identifying areas of common interest and developing SRIAs

The development of the Strategic Research (and Innovation) Agendas is an important milestone for P2Ps that signals the ability of the network to design and implement joint activities. It is crucial that this process is a success as this is usually the first activity that the interested members are called to fulfil. The inability of involved parties to reach an agreement consists the higher risk of failure before the actual start of a collaborative project (OECD 2012). A recent survey of Member States' representatives participating in the Mutual Learning Exercise on "Alignment and Interoperability of Research Programmes" showed that alignment with the jointly developed Strategic Research and Innovation Agendas (SRIAs) is often considered after the design of national research programmes/activities rather than in parallel. (Kolar, et al. 2017b)

Sometimes, a preparatory exercise to start exploring interest and expectations and build trust can prove useful. This can waive strict 'fair return' mentalities attached to national interests, provided it is well-structured and underlined by an inclusive approach.

The Joint mapping exercise that was carried out under FACCE-JPI is an example of a first alignment activity with the aim to identify gaps, as well as potential synergies, and associated actors, and resources. Complemented by foresight inputs from the SCAR committee, this exercise provided direct inputs to the Strategic Research Agenda and Implementation Plan 2014-2015 and helped decision-making on common areas of future interest and prioritisation. The key factors for success were: clearly defined scope and objectives of the exercise; participatory and interactive process in order to promote trust-building and commitment amongst all stakeholders; clear instructions to ensure accurate, complete and comparable data and inputs; appropriate, time-efficient and complementary mapping tools (e.g. questionnaires, workshops, desk study); effective dissemination of results, and an update process of the mapping results.

The experience of JPI Climate in updating its SRIA also provides useful advice on how to organise such a process that needs to be open, transparent and inclusive based on a multi-stakeholder, and at the same time, consensus building approach.

The process of JPI Climate in updating its SRIA involved five distinct steps:

1. Establishment of a Task Force in charge of steering the updating process;
2. Internal consultation among members of the main JPI Climate governing bodies;
3. Stocktaking event with stakeholders in order to have their views on the updated SRIA;
4. Final public consultation: targeted approach by (i) clearly defining the requested input through a questionnaire and (ii) identifying and reaching out to specific stakeholders and experts; discussion of collected responses among the Task Force, including the Chair of the Transdisciplinary Advisory Board, the Management Committee and the Central Secretariat of JPI Climate.
5. Validation and adoption of the updated SRIA by the Governing Board.

The updating of JPI Climate's SRIA applied a cross-cutting and challenge-driven approach, which was not the case for the first SRA as this was more discipline-oriented. Thus, it required a collaborative process, which enabled high involvement of academic and non-academic stakeholders but also showed how difficult it is to optimally integrate all key players in the elaboration process.[10]

The fact that the process what supported by a formal structure, i.e. the Central Secretariat was appreciated. 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, but consisted of an informal process that relied on in-kind resources from potential JPI members based on their voluntary engagement.

On the other hand, the BLUEMED initiative offers another useful example of a well-organised and inclusive process for the development of the SRIA without the support of a formalised structure (such as a JPI's secretariat). The lack of a formal organisation supporting the process was counterbalanced by the high political endorsement that the BLUEMED initiative attracted. The initiative became a priority of the Programme of the Italian Presidency of the European Union (1 July-31 December 2014), and the work among Member States and the Commission intensified to delineate a Blue Growth flagship initiative for the Mediterranean. This strong endorsement was maintained via regular meetings organised also after the adoption of the SRIA in 2015.

[10] Key success factors for organising such processes are identified in the ERA-LEARN 2020 Toolbox of current and novel alignment modalities and instruments
Table Joint action no. 3 Adoption of common strategic research and innovation priorities, section 2.2 p 9-10.

The starting point of the BLUEMED initiative was the mapping of existing/ongoing regional, national and European projects and initiatives, and the identification of the knowledge and technology/innovation gaps and of the "boundary conditions" that allow these gaps to be addressed. A task force involving a restricted number of people abridged the contributions received and finalised the SRIA. The findings were then shared at national as well as EU level addressing all relevant stakeholders. On the basis of the feedback received the SRIA was further refined and shared at EU level. In October 2015 the BLUEMED SRIA was published and officially presented to the EU Ministers for research, innovation and education in Venice to obtain political endorsement. The SRIA was endorsed by 14 EU Countries while 10 countries also signed the Venice Declaration. The BLUEMED SRIA priorities were adopted by the European Commission, DG RTD and DG MARE, and included in their R&I programmes.

Another example of identifying common ground for collaboration based on smart specialisation priorities of different regions and focusing in specific industrial sectors is the Vanguard Initiative.

The 'Vanguard Initiative for New Growth through Smart Specialisation' is a network of 30 European regions that are politically committed to support the wider application and visibility of smart specialisation principles with the aim of boosting EU competitiveness and revitalising European industrial growth. This is delivered by aligning regional areas of strengths and enabling co-investment on the basis of regional smart specialisation strategies. The initiative is organised in the following activities: matching strategic roadmaps, aligning strategic investments, upgrading regional partnerships and clusters, and facilitating access to combined funding. Five thematic pilot projects have been organised until now in the fields (i) Advanced Manufacturing for Energy Related Applications in Harsh Environments led by Scotland and Basque Country, (ii) High performance production with 3D printing led by South-Netherlands, Flanders and Norte, (iii) Efficient and Sustainable Manufacturing led by Catalonia and Lombardy, (iv) Bio-economy, led by Randstad region and Lombardy, and (v) New Nano-Enabled Products led by Skåne and Tampere Region. The pilots focus on applications at post-prototyping level (> TRL5), with the potential for full market deployment in a time span of 3 to 5 years. To date a total of 32 demonstration cases have been carried out. The implementation of the activities is financially supported through projects that were approved by Horizon 2020 and Interreg. Activities are also enabled through close collaboration with PPPs such as the Bio-based Industries Joint Undertaking.

The need for improved coordination at national level

Achieving alignment of national strategies and programmes at the trans-national level needs coordination between the different actors at the national level (ministries, funding agencies, etc.). In a number of cases, the engagement of countries in trans-national collaboration ventures revealed weaknesses to form a national coordinated stance towards alignment and joint programming due to lack of collaboration between the national players involved. (GPC, 2016) In addition, there is usually no overarching, cross-ministerial strategy at the national level that can guide decisions about which trans-national networks to join, nor convincing policy makers about the benefits of international cooperation and/or joint programming. (MLE 2017b)

Austria offers a noteworthy example of national coordination. The Ministry of Transport, Innovation and Technology and the Ministry for Science, Research and the Economy decided to improve national coordination of Austria's participation in P2Ps. A stakeholder group (MULLAT Working Group) was established in 2014 comprising Austrian stakeholders (representatives of ministries, funding agencies and research organisations) involved in the coordination of the country's participation. It was acknowledged that the development of a joint position on alignment would be useful to improve national coordination in order to better support and guide the country's participation in P2Ps. Given the novelty of the 'alignment' concept and the diversity in meaning and interpretations attributed to it, the process included three phases: a) agreeing on a common understanding of alignment, b) collecting the perspectives of key stakeholders and c) deciding after each phase on the next step. Consultation and dialogue were key to integrate all positions, reach consensus and build political commitment. The Austrian experience shows that the process was as valuable as the outcome as it raised visibility and increased commitment of national stakeholders to trans-national research and innovation activities.

As the GPC notes one of main objectives of national alignment is to have structured communication channels all the way from the national JPI representatives to the GPC members. This demands the creation and maintenance of the necessary forums. There are already experienced good practices for such forums that are worthy of dissemination. (ERAC-GPC, 2016)

4. Operational Alignment

A large-scale survey of FP7 ERA-NET participants revealed the significance of the so-called 'programme interoperability' or 'operational alignment' that is, compatible timing of funding across different programmes, common or compatible rules in funding and participation in research activities, and monitoring / evaluation of projects. Specifically, it showed that a) common evaluation procedures, b) common funding rules and c) joint project monitoring were key factors for achieving benefits in relation to transnational research. These findings were also confirmed for the case of JPIs and ERA-NET Cofund actions through targeted interviews, where the lack of programme interoperability was reported, among others, as a key obstacle for the smooth operation of the JPIs. (ERA-LEARN 2020, 2015; 2016)

The operational phase in a P2P when focusing on research projects usually consists of the

- call topic definition,
- call management and implementation (including proposal evaluation and project monitoring), and
- knowledge transfer, dissemination and exploitation of results.

Additional activities may also be conducted such as capacity building and training activities, sharing data and infrastructure, etc.[11] In each of these phases certain challenges emerge in practice. This section presents cases that offer good examples for solving the challenges related to operational alignment.

Identification of call topics

P2Ps are usually supported by a jointly defined strategic research and innovation agenda that then guides the selection of call topics. This is what the content of calls is based upon. However, priorities may be defined very broadly at the trans-national level to ensure that all actors recognise their specific interests and that the priorities will have broad legitimacy and support. (OECD 2012) This in turn creates difficulties when the priorities have to be translated into operational objectives and specific joint actions/activities and eventually into topics for calls for proposals. The broader the selected priorities, the more diverse interpretations, and thus more difficulties in operationalising them.

Nordforsk offers a good example of defining research topics for its joint programmes. While Nordforsk is the prime driver in setting research priorities overall, it is then at the individual programmes where more concrete topics are focused on in specific calls based on the added value identified for each of the Nordic countries. The key actors in this process are the NordForsk Board and Director, the Programme Committees for each programme, and the National Research Councils. The process enjoys a high degree of trust and flexibility, common historic, cultural and political background and similarities. The relatively small number of countries involved also plays a role compared to the wider European landscape.

[11] see for example https://www.era-learn.eu/joint-activities.

The European Metrology Research Programme (EMRP), an Art. 185 initiative, also offers a good example of research topic definiton. The joint preparation of proposals for research topics starts long before the official selection of research projects. Potential research topics are carefully agreed on at national level before being submitted to EMRP (the predecessor to the current EMPIR) 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. National Metrology Institutes, academia and other stakeholders). Thus, European coordination is already observed at an early-stage within the metrology community.

The alignment of national programmes to trans-national counterparts can facilitate the identification of call topics of common interest. The Austrian programme BENEFIT is the national equivalent of the trans-national Ambient Assisted Living (AAL) programme implemented under the Art 185 initiative AAL. [12]

The national programme BENEFIT was created in Austria in 2007 to fulfil the pre-condition to participate in the Art 185 initiative on Ambient Assisted Living (AAL). Following the example of the Nordic countries' programmes, BENEFIT supports interdisciplinary projects with a strong end-users' involvement. BENEFIT is complementary to the trans-national AAL programme in terms of timing as well as research focus. BENEFIT calls open in autumn, while the transnational AAL Programme launches calls in spring. In this ways, BENEFIT projects could be preparatory projects for AAL projects. At the same time, BENEFIT projects are much more concrete and often aim at testing products and services in the local market. As many AAL products need to be adapted to local or national needs, regulations and requirements, this is often realised in BENEFIT projects. Complementary AAL projects then focus on the development of common guidelines based on national testing of products. The alignment of BENEFIT with the trans-national AAL programme was also supported by the creation of an interministerial working group on quality of life and demographic change that was established to ensure exchange and coordination between the different ministries concerned. This was facilitated by the new Austrian RTDI Strategy (published in 2011) which identified "quality of life in the midst of demographic change" as one of the three targeted grand challenges and ensured political commitment towards this research area for the future.

[12] Key success factors for the coordination or synchronisation of national calls for proposals are identified in the ERA-LEARN 2020 Toolbox of alignment modalities, Table on Joint Action no. 10, p. 15.

A central call secretariat for call management and implementation

The most characteristic feature denoting operational alignment in P2Ps is the prevalence of the single entry-point for call management and implementation. (Reale, et. al. 2013) In P2Ps the call secretariats may be resourced by one funding agency, but there are also cases where the call secretariat is jointly created by combining resources from several institutions as in the case of JPI Oceans[13]. The required resources are usually covered either in-kind or by the network members' fees (as in the case of some JPIs) or by allocating a specific share of the EU contribution (as in the case of ERA-NET Cofund actions).

However, it is not unusual that the respective contributions (either in-cash or in-kind) are not enough or suitable to meet the needs of the networks. Confirming the need to solve this issue, members of the ERA-NET Cofund community noted that the most important factors for effective management are a well-resourced coordination office, and a well-resourced, and manageable call secretariat. (ERA-LEARN 2020, 2016) Having a central call secretariat usually means that calls for proposals, submission and, most likely, their evaluation are managed centrally at the programme level rather than at the national level, although it is not unusual that proposal evaluations, and more often project monitoring, are carried out at both the trans-national and national levels. (Reale, et. al. 2013) From the operational point of view a common secretariat greatly simplifies the administrative process and avoids long discussions on how to finance the implementation costs of the call.

While all the cases examined were supported by central secretariats, this was not always the case for the peer review processes. As national research funding organizations may be obliged to implement the review process according to their own national rules and guidelines, the evaluation procedures may differ in terms of the number of reviewers and their selection rules, the measures for preventing conflicts of interest, etc. This may result in excessive burden for both funding agencies and project applicants, in terms of management costs and complexity of the proposal submission system.

One possible solution to this is the application of jointly agreed rules and procedures concerning the project evaluation process among the funding agencies. It is not unusual for P2Ps to take up the FP7 or Horizon 2020 rules and criteria for proposal evaluation especially if the launching of calls is supported by specific EC instrument like ERA-NETs (or the latest Cofund scheme) or if certain P2P calls for proposals have been part of the previous or current EC Framework Programmes.[14]

[13] http://www.jpi-oceans.eu/about/governance/secretariat

[14] Key success factors for the organisation of a joint transnational call for proposals are identified in the ERA-LEARN 2020 Toolbox of alignment modalities, Table on Joint Action no. 11, p. 15.

Another possible solution is offered by the DACH agreement and the Lead Agency Procedure (LAP), an approach that allows the review procedure of the project proposals to be the responsibility of a specific research funding organisation that is delegated as Lead Agency for the review process and follows their own review process and criteria. The Lead Agency Procedure may be applied in the DACH framework bilaterally (changing lead, depending on budgetary or scientific focus of the project), unilaterally (one agency always takes the lead) or on a rotating basis. Based on the LAP model there is no need for double or distributed proposal reviewing which leads to greater uniformity and clarity of rules and procedures, as well as reduction of administrative burden and related costs. Naturally, all funding agencies applying the LAP have to accept each other's procedures, criteria and quality standards. In the case of DACH this is possible due to the small number of partners and the similarity in their project selection criteria and procedures. In addition, the already existing close cooperation among the DACH members is certainly a key factor that facilitates the implementation of the Lead Agency Procedure.

The Lead Agency Approach can also be applied in relation to managing the funding aspect of the call.

In the ERA-NET HERA for each joint call, a partner is appointed as the Handling Agency and is in charge of collecting national funding contributions and distributing them to project coordinators. 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. Concerns to delegate responsibility were overcome by time-efficiency gains and capacity building benefits, and the achievement of operational alignment amongst HERA partners.

Funding procedures and reporting

Funding procedures of projects and reporting on their progress is another dimension that needs extra attention. Incompatibility across national funding systems may cause significant delays to the start of approved projects or even cancellation, as well as high burden for beneficiaries. In some countries beneficiaries are required to submit a separate application for funding to their national funding agency. In BONUS for instance due to the separate national funding streams, beneficiaries must have agreements and receive payments from both BONUS EEIG and their respective national funding agencies.

Project reporting might also need to follow both the jointly agreed P2P procedures as well national guidelines and templates. As an example, in the case of the Electronic Components and Systems for European Leadership Joint Undertaking (ECSEL) due to the differences in funding and participation rules across different national programmes there is the need for double reporting that makes the process of administering projects quite cumbersome. The high complexity and administrative burden of the system may be precluding SMEs and smaller

research organizations from participation. Accordingly, project proposals might need to be evaluated both at the P2P level as well as nationally, thus causing long delays between project submission and evaluation results. Even in the case of BENEFIT, the Austrian programme dedicated to AAL that was created to facilitate participation of Austria in the Art 185 AAL initiative and strengthen alignment with the trans-national AAL programme, there is limited alignment between national and transnational call management. BENEFIT has a different peer review, monitoring and reporting process from the trans-national AAL Programme. This creates problems to the people administering the programmes at funding agency level as well as to potential applicants.

Overall, harmonisation of national and trans-national programmes is mainly limited to (the search for) the synchronisation of reporting period. Yet, whereas harmonising national reporting procedures and eligibility criteria may be impossible in certain countries as it may require legislative changes, there are other cases (as in the Network of Centres of Excellence in Neurodegeneration, CoEN) where application of national criteria and procedures is not regarded as a major constraint.[15]

Sharing of data, research results and infrastructures

Sharing of research infrastructure (data and databases, research methods, results and facilities) may lead to alignment or harmonisation of databases, codifications, or specific research methodologies. At the same time, it can be an activity to start building trust within a P2P network, which is much needed even before trying to define and agree upon a strategic research agenda.

This was the case for instance when the sharing of the German research vessel RV Sonne was organised as one of the first actions in JPI OCEANS. The JPI Ocean's three-year pilot action "Ecological Aspects of Deep-Sea Mining" was launched in January 2015. This transnational research action aims to assess the ecological impacts that could arise from commercial mining of deep-sea minerals called polymetallic nodules. The action brings together researchers from 25 research performing organisations across 11 European countries. 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 the project.

The strengths of this approach include cost reductions in the use of research infrastructure, thus enabling participation of countries with less financial resources, trust-building and development of a common understanding among researchers, as well as standardisation of data collection, coordination of research methods and open access to research data.

While the sharing of the German research vessel is enabled under a three-year pilot action, the Central European Research Infrastructure Consortium (CERIC-ERIC) offers the sharing of a distributed research infrastructure on a longer-term basis.

[15] Key success factors for joint project monitoring are identified in the ERA-LEARN 2020 Toolbox of alignment modalities, Table on Joint action no. 18 p. 23

CERIC-ERIC was created in 2014 by integrating several different facilities into a single distributed infrastructure. CERIC-ERIC provides open access to its member's scientific facilities in materials, and biomaterials in nine European countries to researchers selected by international peer review, and it is also accessible by industrial firms on a commercial basis. It operates under ERIC (European Research Infrastructure Consortium) that is a legal entity based on Article 187 of the Treaty on the Functioning of the EU. CERIC-ERIC is supported by international peer review of projects; common Intellectual Property Rights policy; common monitoring and evaluation framework and agreed key performance indicators; prioritization of CERIC in the national roadmaps; as well as open access to research infrastructures and all results of the experiments.

The Open Access Infrastructure for Research in Europe (OpenAIRE), is a support platform that promotes open access to research outputs across 33 countries from Europe and beyond. It contributes to the alignment of national and EU open access policies. In addition, OpenAIRE enables standardisation and interoperability of research methods and outputs, by enhancing access to existing research data and results, and thus builds a 'linked research environment' 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).

While the above initiatives offer good examples of sharing research infrastructures and commonly applying open access approaches, they do face certain weaknesses. These relate to the voluntary bottom-up approach in participating in OpenAIRE which can be paralleled to the 'variable geometry' principle in P2Ps. This causes variations in partners' involvement and financial commitments. In addition, converging ministries' and organisations' open access policies and having all relevant players on board in governance is a real challenge. Whereas the legal entity of ERIC provides stability in the case of CERIC-ERIC, the particular legal form is not yet widely recognised in the member countries. This causes administrative burdens and delays or even inability of certain countries to take part. The low level of alignment of VAT national regimes forms another weakness. The pilot action of JPI Ocean's for the shared used of RV Sonne found it quite challenging to elaborate a funding mechanism to enable cross-border infrastructure sharing, by several different national institutes at the same time.

Creating new infrastructures by joining efforts might seem more challenging than sharing existing infrastructure but it is not impossible. Leaving aside long-standing, large-scale European joint ventures like CERN, EMBL or ESA, another interesting example that refers to the

city level comes from the New York University.[16]

The New York University Center for Urban Science and Progress (CURSP) is a public-private research centre consisting of academic, industry, and city government partners. CUSP demonstrates the possibility to create a research infrastructure by joint efforts of a variety of actors and highlights the importance of setting clearly defined roles and strong commitment from industrial partners from the beginning. Although CUSP is an example of cooperation only at city/state level, it serves as an interesting lesson for European P2Ps planning to set up a joint research and data infrastructure to address common challenges.

Capacity building, knowledge transfer and interaction with users

Whereas, the primary activity of P2Ps is to launch joint research projects, this is not the only one. Additional activities such as capacity building and training, or dissemination of results and knowledge transfer to end-users are increasingly taken up in P2P work-programmes. EMRP highlighted the importance of encouraging infrastructure-sharing and joint training, while FACCE-JPI offers a good example of capacity building activity, i.e. the Knowledge Hub approach.

The MACSUR Knowledge Hub established 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 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 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 varied financial contributions across participating countries; (ii) limited data-sharing within the Hub; and (iii) a relatively low sustainability potential. 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.[17]

[16] Key success factors for developing transnational access to national research infrastructure, coordinating a cluster of national infrastructures or creating new joint infrastructures are identified in the ERA-LEARN 2020 Toolbox of alignment modalities, Tables for Joint actions no. 22-25, pp. 27-30.

[17] Key success factors for the Set-up of a network of individual researchers are identified in the ERA-LEARN 2020 Toolbox of alignment modalities, Table on Joint Action no. 16, p. 20.

Another example outside the P2P community comes from The European Energy Research Alliance (EERA) that focuses on knowledge sharing and transfer activities. Through the agreed Joint Programmes (JP) of EERA, workshops and conferences are regularly organised as well as exhibitions to reach a wider audience. Additionally, JP members jointly publish scientific books and papers while a central result showcase tool is also being developed. All JPs produce an annual management report addressing (relationship with industry, strategic issues, joint projects, conferences, etc.).

In engaging the end-users P2Ps present a variety of approaches. The European Metrology Research Programme EMRP (and its Horizon 2020 successor: European Metrology Programme for Research and Innovation, EMPIR), for instance, 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, the elaboration of calls as well as the selection of projects to support. In addition, metrologists from the National Metrology Institutes have been encouraged to get involved in end-user organisations (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.

Although there are examples of P2Ps with strong end-user interaction, this dimension can be further improved through learning from public-private partnerships, such as the following.[18]

The Electronic Components and Systems for European Leadership Joint Undertaking (ECSEL) organises two calls per year - one dedicated to innovation actions only. Industry representatives along with Member States and EC representatives take part in the definition of thematic priorities. ECSEL's explicit support for trans-national research and development across large parts of the value chain encourages collaborative projects with multiple types of partners (large corporations, SMEs, non-profit research and technology organizations). For many call participants, the trans-national cooperation and networking opportunity provided by ECSEL represents one of the main motivations and benefits of joining the proposal process. This is essential for smaller countries and firms where it would not be feasible to work domestically across the whole value chain, and collaboration with the "big players" is especially beneficial.

[18] Key success factors for joint dissemination of research results towards stakeholders/end-users Table of Joint action no. 28 pp. 32-33. Key factors for Joint activities and instruments to facilitate up-scaling and replication of research findings are included in the ERA-LEARN 2020 Toolbox of alignment modalities, Table for joint action no. 29, pp. 33.

5. Financial Alignment

A successful case for financial alignment or integration, as called in Art 185 terminology, is EMRP which managed over an 8 year period of existence to bring together about 50% of national resources (mostly in-kind) dedicated to metrology research. However, this is a special case as national budgets dedicated to metrology research are in most cases block-funding of the respective National Metrology Institutes. It is easier to align mainly in-kind contributions of identified national institutes than different national funding timings and rules spanning different national programmes.

A number of issues emerge in achieving financial alignment. Some of them relate to the specificities of the P2P types in question such as the concern to maximise the use of the EC contribution in EU co-funded P2Ps, or the possibility to provide both in-cash and in-kind contributions. While there is a variety of funding models that can be applied in P2Ps the choice of which model to apply may reflect levels of overall alignment and trust within a network. The major concern though underlying national investment is a satisfying return of investment, which is less than easy to agree upon among the P2P members.

A variety of funding models

There are three main funding models applied by P2Ps: the virtual common pot, the real common pot, and the mixed mode (a combination of both). The most used of these is the virtual common pot and the mixed mode. This denotes that National States are not yet that much willing to delegate decisions concerning the budget to supranational structures (Reale, et. al (2013). When cash contributions are concerned then the real common pot, when possible to apply, seems to be considered more beneficial than the virtual common pot.

> The ERA-NET Plus Infravation applies the real common pot approach for funding joint research projects. This has allowed funding the maximum number of research projects irrespective of the applicants' nationalities and regardless of the 'fair return' expectation on investment at national level. Indeed as the Nordforsk experience shows, the main benefit of the real common pot is that it ensures that the best research is supported and thus it fosters excellence in research and optimal use of the available budget maximising the number of funded projects. The use of real common pot is fundamental to help the coordination of larger national investments and create Nordic synergies.

However, applying the real common pot is not easy as this funding mechanism can go against certain national or regional funding rules. Even in the case of Nordforsk that enjoys high levels of trust and long tradition of collaboration among its members, alternative funding models (such as the virtual pot or the mixed mode) are now being considered to allow more flexibility in reaching the objective set to match the Nordforsk's budget with national funding in its programmes (1/3 from NordForsk, 2/3 from national funding agencies).

In addition there are other funding approaches of cross-border collaboration that may also prove useful in increasing financial alignment in P2Ps. One example is the "Money follows Researcher" and the "Money follows Cooperation Line", both promoted by Science Europe (Science Europe, 2014).[19] The "Money follows Researcher" agreement allows researchers to take with them the remainder of a grant to another country. The "Money follows Co-operation Line" agreement allows part of a grant to be used to fund participation of a researcher from another country.

In-cash and in-kind contributions

Whereas, the cost of supporting research projects needs to be covered by cash contributions, the management and coordination of the networks, as well as other types of activities may be supported by in-kind contributions. There are cases, however, where in-kind contributions are also used to support research projects.

Much like EMRP, this is the case for the newly created in-kind Cofund action, ERA-PLANET, where activities are supported with in-kind contributions from 36 research performing organisations. Together, they will organise a joint call of € 61 M and will then be called to implement successful proposals based on their submitted applications.

Another new in-kind Cofund action, ERA4CS, explores how national funding (in-cash) from research funders and institutional in-kind funding from research performers can be combined to support research projects. The 15 Research Funding Organisations (RFOs) and the 30 Research Performing Organisations (RPOs) that participate in ERA4CS will organise one joint call of € 72 M that will be split in two topics. One is to be supported by in-kind contributions made by the RPOs who will then be called to implement their own successful proposals The second topic will be supported by cash contributions made by RFOs and will be open for applications from any research team in the participating counties.

In-kind contributions may also increase participation of Member States with limited competitive research funding in transnational research. However, focusing on in-kind contributions for research is better suited for well-defined research areas that are addressed at national level by a small number of institutes (such as the earth observation area in the case of ERA-PLANET or metrology in the case of EMRP) so that all or almost all can take part. To be able to allocate a high share of in-kind contribution, the call topic(s) should be highly compatible or complementary to those addressed by the different national institutes. This may not be easy to achieve across a large number of institutes.

In European and Developing Countries Clinical Trials Partnership (EDCTP), Participating States jointly fund clinical trials and also make in-kind contributions, that may include allocating research laboratories to projects, clinical trial sites and training programmes that they fund through their national programmes. The vast majority of the participating states' contributions

[19] http://www.scienceeurope.org/wp-content/uploads/2014/05/SE_Crossborder_Collab_FIN_LR.pdf

are in-kind so far. This limits the capacity of EDCTP to integrate European efforts in the area of clinical trials for poverty-related diseases. It also reduces the implementation of the programme, which requires a significant increase to make a real impact.

Overall, there is no one best funding model. The virtual model might work well if it is backed up by adequate shares of national contributions and a reserve amount to enable funding of the full ranking list of approved proposals in case of budgets running out in some countries. The in –kind model might work well to cover administration and coordination although not without limitations. A combination of in-kind and in-cash contributions is also an option but success remains to be seen. The real common pot offers the possibility to fully cover the ranking lists but needs to overcome possible legal issues in cross-border payments, and might not be necessary if other modes (virtual, mixed mode) provide the necessary flexibility.

Ensuring 'fair' national contributions

Another challenge in P2Ps is how to determine "fair" national contributions. NordForsk determines the contribution to a programme for a country by a fraction of the GPD for that country. In practical terms, the GPDs are summed up and a country's fraction will be [GPD(Country)/GDP (Nordic Countries)] * 2/3 * total programme budget. However, the target of 1/3 of the programme's budget coming from the Nordic Council of Ministers and 2/3 from national funds has not been met in recent years although allocation of national to NordForsk has been increasing over time.

> In its last call, the ERA-NET HERA determined the level of national contributions to be made by a country based on data regarding GDP and population, which is of less direct relevance than the national research budgets. In addition to the initial commitments calculated by this model, most partners managed to secure an additional 25% reserve of funding at national level in order to easily follow the ranked list of successful projects.

However, the usual practice of determining the level of national contributions is rather based on available budgets or an ad-hoc estimation of the potential interest of the local research communities to the respective call.

Maximising the use of the EU contribution

Ensuring and absorbing adequate national contributions is a major issue especially for ERA-NET Cofund actions as this determines the degree to which the networks can benefit from the maximum amount of the EU top-up funding. The main reason why national budgets may not be optimally used so as to make maximum use of the EU contribution is usually the low success rate of proposals involving researchers from certain countries, which leads to under-spending of the initially earmarked national budgets. This is inherently linked with the research capacity of the countries concerned and may reflect, among others, low international profiles and networking of the national research communities. At the same time, national contributions of some countries may be insufficient to finance the total of the successful proposals. To overcome both problems some Cofund actions have already devised good practices that safeguard a certain level of fairness across national contributions and the improve success rates of certain countries. (Gøtke et al. 2016)

6. Opportunities and threats to alignment

The future of P2Ps entails threats if the challenges facing alignment are not effectively tackled. Experience has shown that there are certain factors that can contribute to the success of alignment efforts. Interestingly, most of them address the national rather than trans-national level. The lack of these factors constitutes threats to alignment and seriously hinders P2Ps from fully achieving their potential in advancing the ERA and dealing with the challenges addressed.

Political commitment to the Joint Programming Process

Political commitment at the highest levels of hierarchy (ministries) is crucial for the smooth operation of P2Ps, as well as for attracting the necessary critical mass of resources and developing sustainability. High-level political commitment is required by several ministries in cases, such as the JPIs, that are dealing with 'societal challenges' that cut across several different sectors (e.g. environment, health, transport, etc.). (Kolar et al., 2017a) In addition, the decision making structures may differ across different countries with some countries adopting a more centralised approach, whereas in others decisions to participate in joint programmes is delegated to funding agencies. (Reale, et. al, 2013)

A national R&I system that prioritises societal challenges

Triggered by the EU research and innovation policy, many countries have also started to address societal challenges in their national policies. However, the national research and innovation systems may not be appropriately organised for such an orientation. While ministries are organised in sectors, research communities usually reflect bounded scientific or technological disciplinary fields. A generic barrier in many (if not all) countries seems to be the culture of the research community, which has not yet embraced the trend towards challenge-based research. (Kolar et al., 2017a)

A dedicated structure for P2P participation and national coordination

The national JPI engagement should be an integrated part of the national research system, supported by a continuous dialogue with the research community, industry and public sector and inter-ministerial advisory / discussion structures. The national JPI governance structure should facilitate coordination at all levels: at ministry level, at research funding agency level, and at the research performer organisation level. All relevant ministries should have the joint responsibility to process shared experiences and formulate a common national policy for the JPIs. (ERAC-GPC, 1307/16) The existence of an entity to undertake the role of coordination supported by adequate human resources is crucial. (ERAC-GPC, 1306/16)

A dedicated budget for participation in joint programming activities

While a national strategy for participation in joint programming would support decision-making on which P2Ps to participate in, a dedicated national budget would facilitate implementation of such decisions. There are some barriers, however, such as lack of R&D budget in sectoral ministries, or non-existent national research budgets for tackling societal challenges. Nevertheless, there are some good practice cases across Europe and it is expected that dedicated budgets for participation in joint programming may become more common in the future as evidenced in some national ERA Roadmaps. (Kolar et al., 2017a)

Flexible funding for participation in joint programming

Although of major importance, the existence of a dedicated budget is not enough if it is not flexible to allow support to different types of activities (research as well as innovation actions), different types of beneficiaries (of the public as well as private sector), and different types of research (applied, basic, etc.). Some countries find it difficult to support other than research activities (e.g. infrastructure or management and coordination activities). Also, there are often restrictions in types of research and/or beneficiaries that can be funded by a particular ministry or agency. (Kolar et al., 2017a)

A coherent ERA landscape and overarching joint programming strategy

At the P2P level, the GPC (ERAC-GPC 1304/17) sees the following needs to fully realise their potential in further developing the ERA and achieving their missions:

- A coherent research landscape for a given societal challenge supported by an overarching joint programming strategy. P2Ps, and JPIs in particular, deserve a central role in the governance and organization of societal challenge-related research and innovation in Europe, both at country and EC levels;
- More enhanced and broadened commitment and participation in P2Ps in order to ensure their sustainability and to promote national and European coordination. Less research intensive countries should be encouraged to use JPIs and other P2Ps as a stairway to excellence and international collaboration;
- Continuation of efforts to develop mutual trust among MS/AC and foster a true partnership between countries and the related EC DGs;
- Predictable long-term solutions for the management of P2Ps requiring a sustained cooperation with, and support from the EC; and
- Closer monitoring of the impact of P2Ps on alignment and the added value for science and society at the national, European and global scale.

Opportunities for alignment in an uncertain future

Notwithstanding these challenges, the future offers a number of opportunities for enhancing and strengthening alignment of national research and innovation strategies and programing in jointly dealing with societal challenges. Looking at how Europe might change in the next decades, the White Paper on the Future of Europe[20] "*spells out the choice we face: being swept along by the emerging trends, or embracing them and seizing the new opportunities they bring… Europe's future is highly uncertain with serious doubts about globalisation, security concerns and the rise of populism… Europe's population and economic weight is falling as other parts of the world grow… By 2060, none of our Member States will account for even 1% of the world's population – a compelling reason for sticking together to achieve more. Europe's prosperity will continue to depend on its openness and strong links with its partners*." [21]

The GPC recognises that despite initial expectations about mobilising substantial additional funds for research on societal challenges that have proven unrealistic given the budgetary constraints and financial crises, the JPIs have developed into strategic hubs/platforms going beyond the launching of joint calls. The GPC fully supports this development and its further pursuit and considers the achievements of the JPIs and the overall Joint Programing Process

[20] https://ec.europa.eu/commission/white-paper-future-europe-reflections-and-scenarios-eu27_en
[21] http://europa.eu/rapid/press-release_IP-17-385_en.htm

promising and a highly valuable contribution to the advancement of the ERA. (ERAC-GPC 1304/17) National Action Plans and ERA Road-maps confirm the commitment of Member States although readiness to engage in P2Ps varies across different countries. It can be assumed that volume, quality and impact of Joint Programming will continue to grow substantially, notably when an EU policy framework and additional financial means from EU budgets continue to act as a catalyst for Member State action. (ERA Progress Report, 2016)

The deliberations for the next Framework Programme offer the option to design and implement a multi-level approach to joint programming giving P2Ps a more strategic role both at the national and European level. The experts that analysed the first Cofund Actions supported by Horizon 2020 (Gøtke, et al. 2017) agree that the future Framework Programme needs to continue supporting programme level collaboration across interested countries.

The future form of support to public-public partnerships should be an adaptable scheme reflecting the level of ambition and commitment of participating states, the scale and scope of the area addressed, and the relevance to the objectives of the Framework Programme. It should allow for both a 'softer' approach where participating states are committed to collaborate and objectives can be achieved mainly by providing longer-term financial support to management and coordination, as well as a strong 'co-funding' approach for mature networks with strong long-term financial commitment from participating states and high relevance to Framework Programme objectives.

This dual option offers different kinds of opportunities to P2Ps in terms of alignment. Experience shows that a lasting collaboration of partners in P2P networks reflects, among others, high levels of trust which in turn is a key factor for increased alignment. Mature networks should have already achieved a significant level of alignment or should have overcome the major obstacles hindering this. Thus, they may serve as good examples to share for the benefit of other P2Ps or countries that might be more reluctant to increase their engagement in P2Ps and levels of alignment.

The 'softer' approach may be more relevant for new P2Ps or for existing P2Ps where more efforts are needed to build the necessary trust and commitment to move towards more ambitious endeavours. Such a preparatory phase would benefit from networking and trust building activities that call for 'softer' support, rather than joint calls that require more complicated processes agreed among partners. This 'softer' approach would allow the time and efforts needed to build a trusting environment in view of agreeing at a later stage on a strategic research agenda and implementing joint calls.

However, the risk also exists that such a less ambitious approach may not encourage partners to achieve higher levels of alignment, and thus lead some networks to stagnation. At the same time, complexity may arise at the national level in case a country participates in a variety of P2Ps that present different requirements in terms of alignment. Even in the less ambitious P2Ps, however, some degree of alignment would be necessary to allow adequate consensus and convergence so that the trust building activities bear results.

7. Conclusions

There is widespread acknowledgement of the value of P2Ps in bringing together national efforts towards jointly addressing common challenges. A strong momentum has clearly been created that should be built upon. The discussions for the new framework programme offer a great opportunity to assign P2Ps the strategic role they are worthy of in fully tapping their potential for coordinating and orienting European research efforts in jointly dealing with common challenges.

Naturally, the level of commitment and alignment achieved varies from one P2P network to another but also changes over time. The work done by ERA-LEARN 2020 has revealed the variety of challenges facing alignment efforts covering the three levels, i.e. strategic, operational and financial. At the same time, we have managed to identify a number of good practice cases that can provide solutions to these challenges. Importantly, we have looked both within the P2P community as well as beyond and several valuable examples have surfaced.

There are a lot of valuable lessons to be learnt from within the P2P community in relation to all levels of alignment. Additionally, the 'new' alignment approaches examined offer examples of fostering transnational trust-building and cooperation, new funding approaches, strengthening links with industry and other stakeholders, developing a national approach to alignment, and establishment of research alliances and joint research infrastructures.[22] The trans-regional cases examined can be used as examples for other regional or non-regional initiatives, adding a new perspective and approach to public-to-public partnerships, and emphasising the need to foster synergies between EU research and innovation funds. Even if good practice examples at strategic and project level have been developed, a more comprehensive approach should be introduced, especially in the perspective of the next framework programming period.[23]

The choice of alignment approaches depends in a number of specific factors including for instance the research area concerned, the level of ambitions and the institutional features of the partners and countries involved[24]. Yet, it is important to say that alignment needs to be pursued at all three levels i.e. strategic, operational and financial. There have been cases where there is high political will to make progress in terms of establishing close collaboration and identifying common areas of interest, that leads to high strategic alignment. However, this is not easily operationalised if there is little alignment at the programme level, or if there is limited national coordination. In a similar vein, there are limits to operational alignment in case of non-alignment at the financial level.

[22] ERA-LEARN 2020 Case studies of novel modalities for aligning national research strategies, programmes, and activities file://nask.man.ac.uk/home$/Downloads/ERALEARN2020_T4.3_Compilation%20of%20all%20AIT%20case%20studies%20(2).pdf

[23] ERA-LEARN 2020 Report on Alignment at Trans-regional level file://nask.man.ac.uk/home$/Downloads/D4.3%20Report%20on%20alignment%20at%20trans-regional%20level.pdf

[24] ERA-LEARN 2020 Synthesis of Summary: Case studies of current approaches for aligning national research strategies, programmes and activities. https://www.era-learn.eu/alignment/current-approaches/ERALEARN2020_T4.2_CompilationofallINRAcasestudies_summary.pdf

Alignment is a long-term process that feeds on mutual trust, effective collaboration as well as a sense of altruism for the sake of the 'common good'. As much as there are multiple examples of strong alignment and consequent successes in P2P operation and performance, there are also opportunities and threats to alignment of countries' strategies and programmes in the future. Given that we live in an uncertain future characterised by new emerging trends, this constitutes both an opportunity as well as a serious threat. As the White Paper on the Future of Europe[25] stresses the choice is ours: we can either "*be swept along by the emerging trends, or embrace them and seize the new opportunities they bring*", and there are "*compelling reasons for sticking together to achieve more*".

[25] https://ec.europa.eu/commission/white-paper-future-europe-reflections-and-scenarios-eu27_en

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