EUROPEAN UNION

EUROPEAN RESEARCH AREA AND INNOVATION COMMITTEE
High Level Group for Joint Programming

Secretariat

Brussels, 14 September 2018
(OR. en)

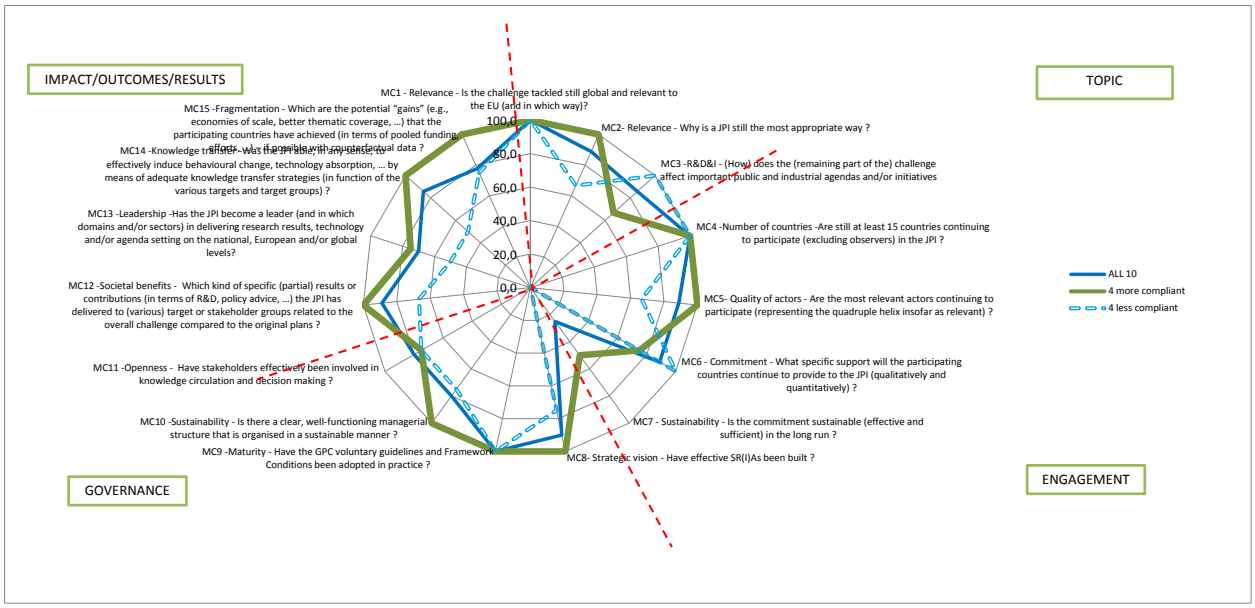
ERAC-GPC 1306/18

NOTE

Subject:	Final Report of the GPC Task Force on the analysis of the Long Term Strategies of the Joint Programming Initiatives

Delegations will find attached the Final Report of the GPC Task Force on the analysis of the Long Term Strategies of the Joint Programming Initiatives as adopted by the GPC at its meeting on 12 September 2018.

GPC JPI Long Term Strategy reports analysis task force



Prepared by:

Pontus Holm (SE, Coordinator)

Patrick Monfray (FR)

Joaquín Serrano Agejas (ES)

Brigitte Weiss (AT)

Table of Contents

Summary

The GPC TF on JPI LTS

The 10 JPIs have all developed Long-Term-Strategy reports (LTS), in cooperation with the GPC working group on the Future of Joint Programming and have presented them at the GPC plenary June 6th; 2017. These reports present a strong narrative of strategic planning and subsequent joint tackling of societal challenges.

The submission of the LTS by the 10 JPIs and the obvious wealth of information presented in these led the GPC to launch a task-force (TF) to conduct an analysis of the whole set of LTS. This analysis is not an evaluation of the JPIs as such, but an analysis of the LTS-reports and is meant to enable the JPIs to take a step forward with regard to their activities and their presentation. The basis of the work of the TF were solely the LTS-documents of the JPIs. The mandate of the TF was to identify good practices and challenges as well as cross-cutting issues and communalities in the LTS of the JPIs and to draw conclusions.

To deepen the analysis of the LTS reports in a more quantitative way and to present more than an impressionistic approach, a set of criteria developed for new and on-going JPI's were applied. These criteria form an extensive framework for assessing the JPIs along four complementary groups of criteria: (1) Topic, (2) Engagement, (3) Governance and (4) Results, Outcome, Impacts. Complementary to this analysis the TF mapped and categorized the collaboration patterns of the JPIs.

During the exercise the JPIs were involved to comment on preliminary results of the assessment. The comments of the JPIs have been duly respected; however the final results of the assessment were upon the TF.

JPIs achievements, good practises and challenges

The analysis of the LTS shows that all 10 JPIs comply in results, outcomes and impact with the overall principles of the Council Conclusion. They have proven to be valuable elements of European R&I, contribute to the development of ERA and contribute to the Framework programme.

The reports point to strong and weaker aspects of the individual JPIs and the JPP as a whole in a manner that often conforms to some of the previous evaluations of the JPIs, e.g. the Hernani Report. The LTS documents have shown to be central to the communication of the JPI concept to the broader research community and shows that the JPP and the JPIs follow an improved common strategy, with respect to the societal challenge they are tackling.

The LTS reports are informative on the R&I challenges and on the positioning of the JPI within this domain, as well as of the remaining challenges. They indicate that the societal challenges addressed are still highly relevant and that a JPI is still an appropriate measure to deal with it. The participants in the JPIs are relevant and in many cases the JPIs gather the most important R&I actors in Europe in the respective domains. The LTS indicate that JPIs are coordinated and follow a number of joint measures, among them are regular JPI chairs meetings, the development of a common set of indicators and a Task-Force on monitoring and evaluation. Many JPIs have become important actors in their domains and they now play a central role in structuring European R&I an in implementing

ERA. With their programmatic approach JPIs are already in line with some of the requirements of the mission-oriented approach in the global challenges pillar of Horizon Europe and this mission-orientation could in turn give a direction for the further development of the JPP across regions and nations in Europe.

The report identifies a number of good practices and challenges, revealing a general pattern, with areas that are straightforward for JPIs to deal with and other areas of general concern. Many of the JPIs have around 20 members or more, all have developed their SRA or SRIAs, with some of them already having delivered updated versions. Most JPIs have established functioning management structures with a clear leadership, a secretariat and advisory bodies suitable for the needs of the JPI.

Among the activities and outcomes of the JPIs are a large number of Joint Calls, the building of stable knowledge hubs, alignment, coordination and networking within their domains, communication activities, the publishing of position papers and extensive international cooperation. All JPIs have managed to counteract fragmentation and to improve the RTI structure and alignment in Europe within their respective domains as a core target for all JPIs. The LTS indicate that JPIs contribute effectively to internationally recognised challenges.

The LTS-exercise however revealed a number of important challenges, possibly the most relevant one being the funding of the JPIs joint activities, the secretariat and of joint calls, induced by a too short commitment horizon of typically just 1-2 years. . Even with substantial joint funding by member states (MS), it has proven to be essential with EU Framework Programmes to enable such complex forms of international R&I collaboration. Many of the challenges for JPIs appear to go back to framework conditions like the still highly heterogeneous national R&I systems. Another general concern for many JPIs is the poor involvement of EU13 countries (as the general low EU13-participation in the EU Framework Programme in general). The rather low participation of industry and a difficulty in engaging all relevant groups of stakeholders can be traced to the initial research focus of the JPIs and remains an important challenge to address.

JPI Collaboration patterns

The LTS provide an opportunity to assemble data on JPI collaboration partners. The TF gathered this information as part of the LTS analysis and the coupled interaction with the JPIs. Two main approaches were followed: a first approach centred on the perspective of the JPIs and their selected universe of collaborations, whereas the second approach focused on the “system”, and all the present JP initiatives and instruments in the fields where the JPIs are active- and where the selected collaborations by JPIs intersect.

The analysis confirmed once again the relevance of the Framework Programme for the JPIs for financing and for positioning themselves within both the European and international societal challenge landscape. Beyond the financial contribution, the existence of several ERA-Nets in a domain translates into increased critical mass in that domain, favouring joint programing in general and also JPIs.

Interconnections among JPIs show that some are exploiting synergies while engaging in joint actions in overlapping priorities or common stakeholders. Regarding interactions with organisations and platforms of regulators, professionals, end users and industry few JPIs stand out as active

collaborators in this field, which has been pointed out as a general weakness. A few JPIs show a wide range of interconnections with infrastructures, while there is still potential for other.

The central and north countries of Western Europe together with Spain and Italy form the core of countries of the JPIs, with the Baltic countries and some of the Black Sea countries becoming relevant in the European JP landscape. Third country membership in JPIs is rising substantially, e.g. of Japan, India, China, South Africa, Argentina, and Australia.

Recommendations

The main recommendation coming out of this work is to form a closer dynamical link between the JPIs, GPC, ERAC and MS under the lead of the Competitiveness Council, including a proactive role of the EC in the Joint Programming Process. JPIs are well on their way to become major players in their respective domains for JPP and for win-win alignment, and have the potential to achieve much more if they were to get stronger high level political support.

To address the needs for realising this broad, overall statement, 7 detailed recommendations have been elaborated by the TF and are described in detail in the report:

1. A stronger mid-term (3-5 years) commitment to the JPP by MS and AC
    a. The long term nature of the challenges tackled calls for stronger, at least mid-term support by MS and AC to achieve the necessary sustainability of the JPIs. The JPP including the JPIs need to be high on the agendas for member states to boost synergies between national and European investments to achieve the desired sustainability. This is a crucial aspect that has been observed also in previous analyses. GPC delegates could play a key role in organising national coordination and support.
2. Continued mid-term (3-5 years) commitment from the EC Framework Programme for leverage effect on MS/AC
    a. The analyses elucidate that the value of JPIs for European research and the ERA, including the EC framework programme. JPIs and their R&D agendas therefore need to be taken into account for planning and priority setting in the Framework Programme. Additionally, as indicated in several of the LTS, even a modest level of EC FP support makes a big difference, like a CSA for funding of coordination.
3. More involvement of stakeholders and industry
    a. With their task of tackling societal challenges, JPIs should in general consider involving multiple stakeholder categories to a greater extent in their core activities. This includes the involvement of industry to a greater extent and the LTS of all JPIs suggest that they are also relevant for industry.
4. A better Alignment between JPP and Horizon Europe
    a. In Horizon Europe, the experience and expertise of JPIs should be viewed as an asset in their respective domains and their challenge-specific exchange should be utilized in priority setting. Naturally it is important that the JPIs themselves initiate interactions to impact the specification of the EU-FP.

5. Strengthened positioning of the JPIs and the other JPP initiatives within the European research landscape and beyond

    a. The LTS display substantial cooperation already and it appears that they are particularly strong in international cooperation. These collaboration should be further intensified and for JPIs to become leaders within their domains they should consider to interconnect with a broader diversity of initiatives.

6. Periodical JPI updates

    a. The LTS constitute valuable strategic documents on the positioning of the JPIs within their respective R&I domains and can be used, among others, in discussions on priority setting and programming at national and at EU-levels. Therefore ideally they should become living documents with regular updates to take into account new developments.

7. A stronger and more active JPP-supporting mechanism

    a. This JPP-supporting mechanism should ensure a properly structured relationship between the actors involved in the JPP, namely the JPIs, MS, AC, the Commission and the Council and should act as a key facilitator for JPIs.

1. Introduction

1.1. The Joint Programming Process

In 2008 the European Commission (EC) proposed the Joint Programming Process (JPP) as a way to tackle societal challenges (SC) in a more coordinated and effective manner. JPP was endorsed by the Council by the end of that year and subsequently the GPC (High Level Group for Joint Programming) was formed with the main task of evaluating Joint Programming Initiative (JPI) proposals. To date, 10 JPIs have been endorsed by the GPC. A few commenced their work already in 2008 whereas the latest additions started in 2011, all working towards their objectives with the European Research Area. The main aim is to reduce fragmentation and increase the impact of national R&I investments, by developing joint strategic approaches, fostering and testing innovative approaches and science-policy cooperation, as well as being gateways for scientific excellence and international cooperation.

The progress of the JPIs and of the JPP has been monitored regularly, for example in the frame of the ERA Progress Reports. The ERA Progress Report 2016 states: *"The analysis shows substantial progress in most MS concerning their participation in the JPI's over the last years. Referring to past trends and measures implemented and/or planned in the NAPs (national action plans), it can be assumed that the volume, quality and impact of Joint Programming will continue to grow substantially. This will especially be the case when an EU policy framework and additional financial means from EU budgets continue to act as a catalyst for MS action.".*

Evaluations also point towards challenges the JPIs and the JPP in general tend to face. As the most recent, the EC Expert Group (Chair Joan Tomas Hernani, Rapporteur Angus Hunter) carried out an evaluation of Joint Programming to address grand Challenges. The so-called Hernani Report, published in 2016, confirmed positive developments, but also identified a number of general concerns, mainly the often not strong enough commitment of MS, the sustainability of their actions, the role of the EC and the involvement of stakeholders and end users.

1.2 The GPC working group on the future of Joint Programming

With this background the GPC Working Group on the Future of Joint Programming, in close collaboration with the 10 JPIs, discussed the future of Joint Programming in the context of the preparation of the next EU Framework Programme (2021-2027), with the aim to visualise a common outline for the future of Joint Programming. A framework for Long Term Strategies (LTS) of the JPIs was developed, covering the following aspects:

- Evolution of the JPI
  - State o Play and major achievements
  - JPI Governance
  - Strategic Research Agenda
  - Joint transnational activities
  - Main effects at European and national levels
- SWOT Analysis
- Vision, Future Goals and Objectives
  - Expected Impact

- Principles for Implementation
    - The Governance
    - Research and Innovation activities
    - Alignment
    - Outreach Activities
    - Monitoring and evaluation
    - Relation with other initiatives and programmes
- Sustainability Requirements
    - Financial perspective
    - Countries Commitment
- Significant Risks and Contingency Plan

In a simultaneous process, the GPC and the 10 JPIs also developed a format for the JPIs to report their short term plans and contribution to the programming process, covering the remaining part of Horizon 2020 (i.e. 2018-2020). Using this format, the 10 JPIs submitted concrete plans for their topics and for how to increase interactions between JPIs etc. These documents were presented by March 2017, in time for the EC programming for the Horizon 2020 Work Programme 2018-2020.

1.3 The Long-Term Strategies of the 10 JPIs

The 10 JPIs developed the LTS according to the common framework described above and presented them at the GPC Plenary of June 6th, 2017. The LTS were highly appreciated by many parties and considered a major achievement and important showcase of the JPIs. They present a strong narrative of concerted strategic planning and subsequent action and delineate how societal challenges can be tackled in joint efforts of MS and Associated Countries (AC), beyond the efforts of the EC.

These Long-Term Strategies of the 10 JPIs constitute the analysis objects of the work of the GPC Task Force on the Long Term Strategies of the JPIs presented here.

2 The GPC Task Force on the Long Term Strategies of the JPIs

The LTS of the 10 JPIs led the GPC to launch a task force (TF) with the aim to analyse the documents to extract as much information as possible in order to further advice GPC, ERAC and fellow JPIs. This TF emerged from the GPC meeting of September 15, 2017 at which the AT, ES, FR, PT[1], and SE delegations volunteered to conduct the analysis of the LTS of the JPIs.

This exercise does not consist of an "evaluation" in itself, but aims to enable JPIs to take a step forward with regard to activities and the presentation of these activities. Good practices and common challenges are highlighted to provide inspiration for further defragmentation and alignment of efforts, potentially leading to more tangible impacts for European citizens and improved result in any future evaluation. Upgraded presentation of JPI achievements, activities and visions can help strengthen the case for an important role for JPIs also in the future in interactions at national, EU and international level. Over and above, the expanded analytical insight into these LTS reports may allow for further substantiation of the present discussion on partnerships and the European RDI landscape.

2.1 Mandate and working method

Mandate of the GPC TF from December 4, 2017

- To advice the JPIs, and also the GPC and the ERAC, of individual good practices and challenges as well as cross-cutting issues identified in the LTS, both with regard to actual JPI activities and to how the work is presented. The main aim is to further draw from the rich material of the ten LTS to give JPIs pointers to attractive activities, solutions and ways to develop the reporting itself.
- To provide information on commonalities, dissimilarities, patterns and synergies that may serve as a platform for a future extended evaluation of the broader questions of JP, JPP, partnerships in the next EU framework programme and the evolution of ERA etc.

The TF also suggested the following methodological approach

- Read and analyse LTS of four JPIs each, meaning each LTS is analysed by two analysts.
- Extract qualitative data from the reports such as good practices, challenges, trends and patterns etc.
- Utilize the criteria from GPC Implementation Group 3 for monitoring and evaluating JPIs (IG3 criteria) for a quantitative analysis of trends and general phenomena.
- Summarize interactions with other partnerships public or private (P2P/PPP)
- Discuss preliminary results with the JPIs

The two analysts of each LTS extracted examples of good practices and challenges from the LTS text to produce a list of qualitative LTS features. This list was then analysed and categorised to produce the general and JPI-specific points presented in chapter 3.

A major part of the analysis work was to apply the IG3 criteria to the LTS (results presented in chapter 4). These criteria form an extensive framework for assessing the various aspects of the JPIs and were primarily developed for information quality control. The IG3 criteria are described and

[1] This report received contributions from Maria João Sequeira (FCT, Portugal).

discussed in more detail in Annex 1 (chapter 7.1). They are organized following four complementary axes or groups of criteria:

- Topic
- Engagement
- Governance
- Results, Outcomes, Impacts

For each criterion, a grade of Yes or No was given for a) whether there is enough information available in the LTS to answer the criterion question, and b) if so, is there a conviction for the reader on the compliance with the criterion question? Potential facts not mentioned in the LTS were not considered as the task of the TF was the analysis of the LTS and not an evaluation of the JPIs themselves.

It needs to be pointed out that the IG3 criteria used in the analysis were in fact not mentioned in the framework for Long Term Strategies that the JPIs and GPC developed together as the template for the LTS. Hence, JPIs cannot be expected to have addressed all IG3 criteria. For some criteria, it may well be a conscious decision of the JPI to not address it, if it is not deemed central to their presentation. The motivation for using the IG3 framework for this exercise is the fact that it represents a thoroughly discussed and accepted framework that may allow pointing to achievements and possible improvements in a systematic way. Not having addressed a certain criteria should be a cue for a JPI to look into that criteria and make an active decision of whether it needs to be addressed. With a grading scale of only two grades (Yes or No) it is also important to point out that a No typically doesn't indicate that no effort has been made but rather that the potentially significant effort put in at this stage has not been deemed enough to warrant a Yes grade.

Another highly interesting angle of analysis is that of JPI collaborations with other key initiatives or partners, from public to private, from European to international (results presented in chapter 5). The TF has aimed to map and categorise all JPI collaboration partners –as described in the LTS and also in an up-to-date version – to capture, within the complex landscape of societal challenges, the networking capability of JPIs and its dynamics. We have depended on the assistance of the JPIs also for this task.

3 Results of the Qualitative Analysis of the LTS

3.1 General observations

These observations are based on the LTS documents of the 10 JPIs, and complement the analysis using the IG3 criteria, and constitute a summary and interpretation relative to the defined objectives of the JPP, of ERA and of European research.

All 10 JPIs have produced their LTS according to the structure elaborated jointly between GPC and the JPIs - this can be considered as an important achievement in itself. These documents are central to the communication of the JPI concept to the broader research community and shows that the JPP and the JPIs follow an improved common strategy, with respect to the societal challenge they are tackling. With this they contribute to strengthening the position of JP in the European R&I-landscape as the 10 LTS represent structured plans for the future work of the 10 JPIs in their fields of R&I. Despite variations, the LTS reports are generally of good quality and address the most relevant aspects concerning the topic of the JPI. The LTS reports are informative on the R&I challenges and on the positioning of the JPI within this domain, as well as of the remaining challenges. Some of the LTS refer to points of the Hernani report (Examples: HDHL, JPND, Water).

Overall the LTS documents indicate that the societal challenges addressed are still highly relevant and that a JPI is still an appropriate measure to deal with it, in particular for networking and alignment within complex and fragmented R&I landscapes. All JPIs tackle issues that cannot be handled by one MS alone or solely by national activities. In a few cases JPIs discuss further integration into more structured forms of organisation, like an Initiative according to Art 185.

The participants in the JPIs are relevant and in many cases the JPIs gather the most important R&I actors in Europe in the respective domains; however additional participation could still add value. In many cases additional key stakeholders from public and private sectors or from civil society could be included, as well as a higher participation from less R&D intense countries, industry and societal actors.

Not all 10 LTS are of equally high quality for different aspects and some LTS do not fully answer all that was asked for when the structure for the LTS was developed and agreed by JPIs and GPC. Some of the LTS were submitted as drafts, with still no final version having been put forward. The LTS also point to strong and weaker aspects of the individual JPIs and the JPP as a whole in a manner that often conforms with some of the above-mentioned earlier evaluations, e.g. the Hernani Report. Strengths and weaknesses of the LTS are described in the chapters 3.2 and 3.3.

The drafting of strategic plans by the 10 JPIs for the remaining period of Horizon 2020 and this elaboration of LTS was the first such exercise by all JPIs following a joint structure. However, the LTS reports indicate that JPIs already follow a number of coordination measures:

- There are regular JPI chairs meetings for which individual JPIs alternate to host where the JPI chairs discuss management issues and joint challenges, their positioning within the Framework program and their topic and how to develop the JPI further.

- JPIs are currently developing a roadmap to propose a common set of indicators to all JPIs. A Task-Force on monitoring and evaluation has been established, in collaboration with ERA-LEARN.

3.1.1 The relevance of the JPIs

JP and the JPIs have become relevant actors in the European R&I landscape, but some of the JPIs stated in their reports that they are not yet global leaders in their respective domains. The JPIs relative weight and influence in their respective domains is dependent on factors like:

- The quality and volume of joint activities
- The level of alignment of national policies and R&I programs achieved and activities the JPIs are coordinating
- The size and quality of their membership, as well as the involvement of non R&D-actors (stakeholders, industry, implementation)
- The quality and volume of joint R&I they are able to initiate
- The extent to which the JPIs are able to initiate or coordinate implementation of their R&D actions
- The level of commitment by MS
- The possibility to get FP-funding (CSAs, ERA-Net Cofund...) and the level of funding
- Membership (numbers of countries, involvement of less R&D intense countries, involvement of the relevant stakeholders)
- The communication and dissemination of results to research communities and to actors outside of science.

In the majority of cases important R&I priorities and programs in Societal Challenges of European MS and AC appear to be reflected in their participation in the respective JPIs. Thus JPIs play a relevant role in structuring European R&I and in implementing ERA already. However, the potential of MS participation strongly depends on structural and R&I-policy aspects, like the priorities and volume of national R&I programs and the processes of national policy making. For some topics important alignment with European research could be observed, reflected in subsequent ERA-net Cofund within some of the JPIs or even with planned EJP-Cofunds.

It has to be pointed out that the key direct actors in a JPI by definition are normally R&I program owners or managers (not researchers). Researcher's participation is via calls for proposals and alignment activities. The quality of researcher participation could only to some extent be estimated by the analysis of the LTS as it was not the key part of the LTS to elaborate on results of calls and R&I-projects.

3.1.2 JPIs and the Mission Oriented approach

With their SRAs or SRIAs and their implementation activities, JPIs structure R&I in their respective domains and follow programmatic approaches within their societal challenges, combining a number of complementary actions serving their goals, like joint calls, joint research agendas, mapping, alignment activities, just to mention a few.

These are already important steps in line with the new mission-oriented approach in the global challenges pillar of the next FP (Horizon Europe). Some of the requirements for missions laid down in

the report on the new mission oriented approach for Horizon Europe by Prof. Mazzucato[23] are fulfilled by the JPIs to a much greater extent than by most of the actions in the Framework Programme. Some of the requirements for the Missions-Oriented Approach in this concept approach are:

- Bold, inspirational, with wide societal relevance
- A clear direction: targeted, measurable and time-bound
- Ambitious but realistic R&I actions
- Multiple bottom-up solutions requiring a systemic approach and many different actions by many different types of actors

This mission-orientation on the one hand could give a direction for the further development of the JPP and of the JPIs and shows that some of the JPIs could have a potential to form the basis of Missions in FP9 (Horizon Europe) or to be part of a mission. It appears however clear that none of the JPI fulfils all criteria for being a mission according to the EC's approach already now.

3.2 Good practises

The compilation of good practises and challenges of the JPIs revealed a general pattern, with areas that are straightforward for JPIs to deal with and other areas of general concern.

3.2.1. Structural aspects

- All JPIs have a sufficient number of MS and AC as full members of the JPI (all JPIs have at least 15 MS and AC as full members; many of the JPIs have around 20 members or more). There is however great variation among the JPIs regarding attracting additional members, including from countries beyond Europe, as several JPIs describe in their LTS.
- All JPIs have developed a joint SRA or SRIA[4], with some of them already having delivered updated versions and some are announcing that they will shortly publish an updated version. Examples for JPIs with an updated SRA or SRIA are JPI FACCE, and JPI HDHL. All SRA or SRIA represent the agreed priorities for R&D and other joint actions as well as for the further development of the JPI.
- All JPIs have established functioning management structures with a clear leadership, a secretariat and advisory bodies suitable for the needs of the JPI (there is no joint structure but tailor-made approaches). The levels of sustainability vary throughout the JPIs. While, as a good-practice example, JPI Urban Europe managed to establish a management based on membership fees and stable in-kind commitments, some other JPIs rely on CSAs to finance their organisational structures.
- According to the LTS all JPIs collaborate with one or more of the thematic units in the EC dealing with their R&D domains. They receive or have received funding for CSAs or ERA-Net Cofunds. Thus JPIs were to some extents involved in R&D priority setting; however the influence of the individual JPIs on Horizon 2020 was variable, depending on many factors. What is more, this involvement was exclusively on an individual basis and not in the frame of a structured process or an institutional setting. On the other hand, funding from the EU-

[2] Mazzucato, M. (2017) 'Mission-oriented Innovation Policy: Challenges and Opportunities', UCL Institute for Innovation and Public Purpose Working Paper, (2017-1).
[3] Mazzucato, M. (2018) 'Mission-Oriented Research & Innovation in the European Union A problem-solving approach to fuel innovation-led growth, European Commission
[4] The SRAs or SRIAs are referred to in the LTS but are separate documents

Framework programmes has proven to be essential to enable such complex forms of international R&I collaboration, both for coordination and for joint calls.

- For many of the JPIs, the rationale for forming them was the recognition of the lack of a joint comprehensive integrated approach of the R&I of the respective domains. The development of the JPIs and their future strategies described in the LTS show that the JPIs are on track for delivering on this. Examples include:
    - R&I on the "One Health-approach", realising that the health of people is closely connected to the health of animals and the environment (JPI AMR)
    - R&I on Cultural Heritage in an integrated approach (JPI Cultural Heritage)
    - R&I for a robust evidence for sustainable urban solutions (JPI Urban Europe)
    - R&I on demographic change: JPI MYBL

3.2.2 Activities

- All JPIs have undertaken Joint Calls and have jointly mobilized substantial amounts of funding, mostly from national sources. As an example, JPI FAACE has mobilized 114 Mio. € (by mid-2017), 80% of which came from MS. This represents a very high leverage of Framework-Programme funding and shows a high commitment by MS and AC
- All JPIs have a regular exchange with other relevant initiatives in their domains, for example JPI Climate with other relevant JPIs, the programme Committee of SC 5 Climate, the Belmont Forum, Climate Europe, PLACARD (Platform for Climate Adaptation and Risk Reduction)
- Some JPIs have created Action Groups (AGs) for topics/scientific themes that still require maturation, for example JPND
- Almost all JPIs organize relevant thematic conferences, often annual or biannual. Examples are the JPIs AMR, Oceans, HDHL, Water, MYBL
- Many of the JPIs align their activities with international consensus priorities. Examples are the JPIs HDHL, Climate, AMR, and Water.
- Many of the JPIs are internationally recognized and collaborate with stakeholders world-wide, for example:
    - JPI AMR interacts with stakeholders such as WHO, ASEAN, G7 and international partners like the USA
    - JPI Urban Europe is in particular active in collaborations with Chinese institutions, like NSFC (National Natural Science Fund China) and CCUD (China Centre for Urban Development). JPI Urban Europe also launched an international call on Sustainable Urbanisation together with the Belmont Forum
    - Recognizing that demographic change is a global challenge JPI MYBL actively involves Canada and Israel in its activities and is about to expand its collaboration by including China, japan, South Korea, and USA
    - JPI Water had a cofunded call with South Africa
- Almost all JPIs have published position papers, e.g. JPI Water, JPI UE
- Some of the JPIs organize early career workshops as capacity building activity, for instance JPI MYBL
- Some of the JPIs use a sustained strategy of communication and dissemination, for example JPI JPND
- JPI AMR established a Virtual Research Institute as a platform for scientific interaction between MS
- Many of the JPIs are involved in political discussions in the domains of the JPI, such as the JPIs FACCE, JPND, AMR, Oceans etc.

- Some JPIs, for example JPI JPND, engage in the improving of national coordination structures with all relevant stakeholders (e.g. Ministries, research funders, RPOs, etc.)
- Many JPIs cooperate with the EC in the domains of the JPI, for Example FACCE, by organising special events e.g. the "Grand Debate on Nutrition Security" or the event "International Soil research: Opportunities for synergy and cooperation with FACCE JPI". Input from JPI FACCE is also considered when designing FP priorities and calls.
- Nearly all JPIs have developed a strong international cooperation agenda, via membership or partnership. This is an area where Horizon 2020 has struggled and where JPIs constitute Europe's most developed and successful form of initiative.
    - Positive examples: JPI Climate, JPND, JPI Water, JPI AMR, JPI UE: joint calls with Chinese institutions in 2017 (CCUD, China Centre for Urban Development and NSFC, National natural Science Fund); JPI FAACE: New Zealand became associated member in 2016
        - Comment: Is the governance model developing as membership gets increasingly heterogeneous? Partnerships could be also very effective at international level (e.g. JPI Climate and Belmont Forum)

3.2.3 Outcomes

- All JPIs have managed to counteract fragmentation and to improve the R&I structure and alignment in Europe within their respective domains. This is a core target for all JPIs. Some examples for achievements are:
    - JPI Climate aligns 30 RPOs from 17 European Countries as partners of the "European Research Area for Climate Services (ERA4CS)
    - JPI JPND has created a European Research Area in the field of neurodegenerative diseases through a common vision and an alignment of national activities and is now a reference for European and global knowledge and innovation
    - JPI FACCE influences already around 65% of the RTI in its domain (from 'high extent' to 'some extent')
    - JPI Oceans saves R&D-costs by sharing expensive research infrastructure and by aligning existing R&D priorities and activities
    - JPI Urban Europe created a platform connecting the highly diversified R&I landscape through workshops, conferences and networking activities and strengthened links to urban networks and key organisations
    - A Master Thesis showed the strong influence of JPI HDHL on the alignment of national R&D priorities in the 26 MS of JPI HDHL

  JPIs are building stable Knowledge hubs and networks in their domains. This includes the JPI AMR "Virtual Research Institute" and three knowledge hubs supported by HDHL, as well as the three JPI FACCE hubs "Knowledge Hub Modelling European Agriculture Soil Quality / MACSUR", "the Knowledge Network for Sustainable Intensification of Agriculture / KNSI", and "the Thematic Annual Programming network on Soil / TAP Soil". Several of the JPIs effectively involve stakeholders, although this is not yet a common pattern. A good example for stakeholder involvement is the JPI JPND with its Patients Involvement Strategy, another one JPI Urban Europe with involving funding bodies, RPOs, cities and civil society relevant for R&D and implementation. A third is JPI AMR's permanent working group with the EC (DG Research and DG Santé) and NIH, TATFAR and other US players, as well as the pharmaceutical industry via IMI, EFPIA, and BEAM.
- All JPIs now have leading positions at least in parts of their R&D domains. For example JPI Climate now plays a key role in climate services research. The large scale ERA-Net on climate services, ERA4CS funded projects for more than 60 M€ with an additional 20 m€ of in kind-

contributions. This major JPI Climate activity will subsequently have a major influence on future activities in this domain.

- Within all JPIs important and successful R&I has been funded, that otherwise would not have been possible. Examples are:
    - The project PROTHEGO within JPI Cultural Heritage. The PROTHEGO project will provide a new remote sensing tool and a new methodological approach for the safety management of Cultural Heritage. Cases studies will cover more than 450 UNESCO world Heritage Sites. This highly interdisciplinary project brings together disciplines from Space, Earth Sciences and Cultural Heritage conservation sciences.
    - Case studies by JPI Oceans involving many countries: on ecological aspects of micro-plastic in the marine environment, on ecological aspects of deep sea mining, etc. These case studies were of important political relevance and led to follow-up activities.
- A great many of the JPIs have established stable collaboration with partners from countries beyond Europe and thus strongly contribute to the internationalization of European R&I. Some examples are:
    - New Zealand participates in JPI FACCE
    - Projects of JPI Climate have involved Brazil, India, China and Japan and these countries, including Qatar are Additional partners of JPI Climate
    - Australia and Canada are participants of JPI JPND
    - JPI Urban Europe has built relationships with Chinese actors and funders since 2013, including signing a MoU with CCUD China Center for Urban Development and NSFC National Natural Science Fund.
    - JPI HDHL involves Canada and New Zealand as members
    - South Africa is a member of JPI Water
    - JPI Water includes Canada as a member
    - JPI AMR extends well beyond Europe including members such as Japan, Argentina, South-Africa and other nations.
- JPIs contribute to internationally recognised challenges, for example:
    - JPI Urban Europe addresses sustainable urbanisation and responds to global urban challenges and thus addresses the EU Urban Agenda, the UN Agenda 2030 and Sustainable development Goal no.11
    - JPI Water supports EU water policies, e.g. the Water Directive and its daughter directives as well as some of the UN water-related sustainable development goals.
    - JPI Climate already now supports Sustainable development Goal no.13 “Take urgent action to climate change and its impacts’ as well as the implementation of the COP12 Paris Agreement. Further important actions are proposes in the JPI Climate SRIA 2016-2025. The enlargement of the Alignment of relevant national activities in the “European Research Area for Climate Services” ERA4CS is an important initiative in this regard
    - JPI JPND has taken major steps in the achievement of a European Research Area in the field of neurodegenerative diseases, has implemented a stronger global dimension and has developed into a reference for global knowledge and an innovation platform for neurodegenerative diseases
    - JPI AMR is a well-recognised research platform in Europe and beyond tackling the global issue of antimicrobial resistance

- JPI MYBL tackles the major challenges related to demographic change, like social, economic and political implications of growing retirement, the rising demand for expensive health care and the future distribution of wealth between generations.

3.3 Challenges

A major challenge for all JPIs is the **partially lacking commitment of MS**, in particular with respect **to funding secretariat and research activities, and to align national programs** beyond usual joint calls with transnational teams. This is also linked to a (partially) insufficient integration of the JPI in the national R&I landscapes and to the inability of some of the members to provide the funding required (due to lacking funds or adequate budget line, the sometimes non-existence of national programs, differing structural aspects of the R&I landscape in some MS, etc.). An important issue is that national R&I systems are still highly heterogeneous and have a long way to go towards sufficient alignment. This lack of alignment often relates to programming and thematic aspects, research communities behaviour, and also to a high heterogeneity in funding rules and modes of implementation using various instruments (e.g. grants, infrastructure investment and access, national calls, think tank, innovation ecosystem, etc.).

The recent MLE (mutual learning exercise) on national alignment provides important guidelines towards this end, including the identification of success stories and trust building experiences that could well be used as seeds for an emerging wave of alignment.

Overall, a common issue is a national horizon for budget commitments of two years or less, while JPI challenges require long term sustainability with a strategic vision over 5-10 years and an implementation capacity horizon that stretches over 3-5 years.

3.3.1 Structural aspects

- Many of the JPIs depend heavily on EC support for maintaining the joint management structure (JPI Secretariat) and for the top-up to joint calls that strongly catalyse national supports. This appears to be a quite general issue that has also been observed in evaluation reports (e.g. Hernani Report).
    - Achievements and positive examples to that respect are:
        - JPI Oceans, which is active in institutional alignment and less dependence on funding for Joint Calls
        - JPI Urban Europe for which the Management Structure is financed by contributions from MS and is fully independent from FP-funding
        - JPI Climate had also experienced strong leverage for alignment of 30 national Research Performing Organization (RPO) by using mixed ERA-net with cash from RFO and in-kind from RPO to support 63M€ of projects on Climate Services
        - Joint calls are considered an important asset, needed to attract additional members and to facilitate joint activities that otherwise would not be possible. However, co-funding is found key, amongst others valuable, to increase the participation of less R&I-intensive countries (e.g. EU13) ;
- In several of the JPIs there is a rather uneven participation with only a few countries doing the major work. For example, in one case the JPI Chair didn't rotate even after 4-5 years, while participation in steering committee or secretariat support is made essentially by 3-4 countries with rare rotations. This scheme provides a sustainable structure that has proven

valuable and sometimes evidently successful. However, it could reduce trust building and appropriation by other countries or stakeholders.

- Overall, structural aspects are often linked to the sustainability issue and mid to long term engagement of countries.

3.3.2 Activities

- The poor involvement of EU13 countries is a general problem of many JPIs (as for the entire P2P and PPP-family). Reasons are probably very similar as for those that hinder the participation of those countries in H2020 as well as other international collaborative initiatives.
    - Positive Example: JPI Urban Europe undertakes specific dedicated measures to increase the participation on EU13 as issues related to urbanisation are highly relevant for EU13. Currently there is an active CSA for that purpose, which helps also to align structural funds within EU13 territories. JPI Climate had also experience with in-kind alignment of Research Performing Organizations in EU13 eligible to the ERA-Net for Climate Services (ERA4CS)
- Inadequate involvement of industry and the still insufficiency to address the innovation beyond concept
    - Positive Example: JPI Water strengthens ties with the private sector by involving PPPs in their Stakeholders Advisory Board (e.g. European Innovation Partnership on Water) and JPI AMR has regular meetings with IMI and EFPIA
- Difficulty in engaging all relevant groups of stakeholders, to cover relevant sectors or territories, beyond participation of some key actors within JPI stakeholder advisory boards
- Poor follow-up of effects of policy-influencing activities such as publishing position papers, influencing high-level meetings (G7, IPCC, WHO, OECD, etc.)
    - Positive examples: JPIs Water, AMR, Oceans.

3.3.3 Outcomes

- Many LTS reports are not clear on concrete and tangible outcomes of their activities. This may in part be due to the nature of the task of drafting these LTS reports: **focus of the LTS was on future activities**, not so much on past achievements. It is also a fact that it takes decades to develop programs and projects to a level where tangible outcomes and impacts can be measured.

3.3.4 JPI LTS Report

- Several LTS reports displayed a weak and uninformative milestones section. Items like SRIA content and sustainability concerns are presented instead of references to the fulfilment of **short and medium term** goals or outputs, i.e. up to around 5 years. The milestones section should preferably make it immediately obvious to the reader that the national and EC funds have been put to good use and that there is progress
    - Positive examples: JPI AMR, FACCE
- A general challenge is the information on achievements so far. In case there are seemingly few tangible results to report, an effort should be made to find and describe case studies, success stories, alternative kinds of impact, etc (See related comment in chapter 3.3.3 Outcomes above)
- Unclear level of MS involvement and regional distribution of expertise, as well as the rotation cycle of various responsibilities, beyond the static membership map

- In some of the reports the long-term strategies still do not appear to be finalized and strategies are not sufficiently concrete and strategic, and many reports are submitted as 'draft'. Examples: JPIs Oceans, FACCE, MYBL, JPND, CH

3.3.5 Quantitative analysis of LTS report using IG3 Minimum Criteria

To deepen the analysis of the LTS reports in a more quantitative way, a set of criteria developed for new and on-going JPI's were applied.

In 2016, 32 criteria were proposed by the Implementation Group 3 of ERAC/GPC to monitor on-going JPIs and the proposal of new JPIs (see results in chapter 4 and methods in chapter 7), whereof 15 Minimum Criteria (MC1 to MC15) are considered to be the necessary conditions to be effectively compliant with the initial JPI spirit. Figure 4.3.3 in the next chapter summarizes the estimations made by this report and help to quantify the diversity of challenges faced by the 10 JPIs.

A comprehensive display of the GPC/IG3 criteria analysis is presented in chapter 4. In summary, the result points to a good to excellent compliance for EU relevance (MC1), participation of at least 15 countries (MC4), followed GPC guidelines and framework conditions (MC9) and clear managerial structure (MC10). Interestingly, it also confirms the main qualitative issues identified above:

- **Long term commitment**: JPIs have implemented long term strategies (5-10 years) to face global challenges (MC8), regardless of weak to no sustainable commitment for the long term from MS and EC (MC7). Contrary to the situation for long term support, specific support for the short term (1-2 years) seems to be available (MC6).
- **Stakeholder/Private sector engagement**: There is capacity among the more compliant JPIs to deliver societal benefits (MC12), induce behavioural change or technological absorption (MC14) and achieve some potentials gains in terms of economies of scale and better thematic coverage for countries (MC15). Nevertheless, difficulties prevail to affect public and industrial agendas (MC3). and involving stakeholders (as industry, regulators and end- users) in decision making via advisory boards (MC11);
- **Joint Programming Governance and Results**: For the less compliant JPIs, a more heterogeneous pattern stands out - it is not obvious that a JPI is the most appropriate way (MC2) to structure a complex and/or fragmented landscape, where other partnerships may exist. It remains a challenge to involve the most relevant actors (MC5) and to take the lead in delivering results (MC13).

4 Detailed Analysis using the IG3 criteria

4.1 General framework

According to the TF Mandate and the defined methodology, the analysis of the JPIs LTS Strategy reports was not only bound to an impressionistic approach on good practices and challenges, but deepened into a more analytical process, performed on the basis of the IG3 criteria (see chapter 7.1, Annex 1 where the criteria are described in detail). All the supplied information was scrutinized in the light of each of the GPC IG3 criteria for existing JPIs. These criteria are meant as a consistent quality control framework (or guideline) according to which the JPI governing boards (and national governments) can collect and organise information and perform an internal evaluation themselves of the performance of a JPI.

As previously stated, it is important to mention that the JPI LTS have not been developed along this set of criteria and might not be able, or even aim, to answer all of the IG3-questions. This does not necessarily indicate a possible weakness of the JPI. The TF has based this analysis solely on the written LTS reports and has not considered any other documents, such as the SRIA or website, or oral information.

Some relevant methodological considerations should be stressed. Firstly, the analysis was conducted by evaluating two variables for every criteria; available Information and Compliance. This was not the original intention of the quality control tool on information that IG3 developed. Analysing also compliance consisted of a further step, and should therefore be interpreted cautiously, as already mentioned, not necessarily as a grading of the performance, but rather as the perception of the reader on the basis of the information available (in the report), concerning the activities of the JPI on each criterion – regardless of any other information.

In order to produce an analysis in a macro/global way and to be able to identify general patterns, an approach on the bases of the Y[es]/N[o] grades was developed, assuming that whenever the grade is N[o] for information, it will necessarily be accounted as N[o] for compliance – since our focus is analysing and facilitating to improve the report itself, not taking into consideration other possibly available information. In essence, if the information is not present in the report, then it is not possible to assess compliance.

To properly represent “compliance” as a variable dependent on the “information” variable, the number of Y[es] for compliance for each criterion is presented as a % of the number of Y[es] for information. The total sum of Y[es] for information is presented as a % of the total number of JPIs, i.e. 10.

An approach on preselected groups – the 4 JPIs with most Y(es) for compliance and the 4 JPIs with the fewest was also conducted, in order to capture nuances in commonalities and diversity between JPI LTS.

Reference guide for the presentation of IG3 criteria grades:

I- for all JPIs:

a) *Displayed value for Information for each criterion: the total sum of Y(es) grades for information divided by the total number of JPIs, i.e. number of Y(es)/10, expressed in %;*
b) *Displayed value for Compliance for each criterion: the total sum of Y(es) grades on compliance divided by the total sum of Y(es) grades for Information.*
    a. *Example: If the 10 JPIs received 8 Y(es) for Information and 8 Y(es) for compliance, this would be presented as 80% (8/10 in %) for Information and 100% (8/8 in %) for Compliance.*

II- for pre-selected groups of JPIs (a particular case of I):

a) *Displayed value for Information for each criterion: the total sum of Y(es grades) for Information in a preselected group divided by the total number of JPIs in that group;*
b) *Displayed value for Compliance for each criterion: the total sum of Y(es grades) for Compliance in a preselected group divided by the total sum of Y(es) grades for Information of the pre-selected JPIs of that group.*
    a. *Example: If the 4 JPIs of a pre-selected group received 2 Y(es) for Information and 1 Y(es) for Compliance, this would be presented as 50% (2/4 in %) for Information and 50% (1/2 in %) for Compliance.*

Since all these criteria were considered crucial by IG3 for the monitoring and evaluation of JPIs, especially the Minimum Criteria (MCs), we considered for this analysis a result of 80% or more as highly satisfactory and 70% or less as not satisfactory.

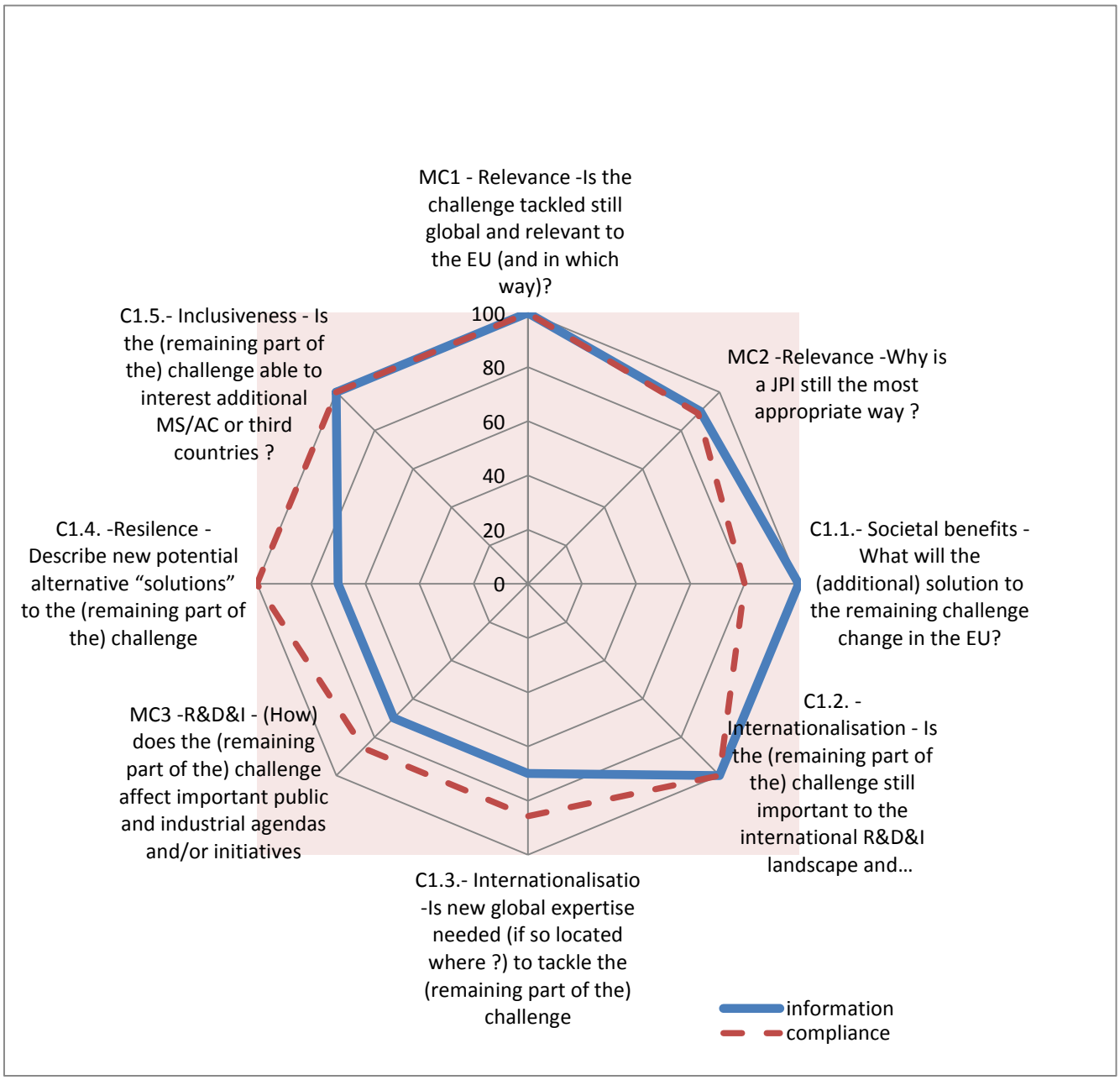
For a complete list of the results, please see chapter 7.2 Annex 2, Completed IG3 evaluation Tables

4.2 Results - General criteria

An insight on the Topic – Figure 4.2.1 discloses mostly coincident patterns for Information and Compliance, if not more favourable in the latter case. The JPI LTS display strong information content for the categories *Value added* (*Relevance of the Topic*, *Adequacy of the instrument* and *Societal benefits in the European context*), and *Coverage* (*Inclusiveness of additional MS and third countries*). For *Internationalisation*, the picture is more heterogeneous with strong content for *Importance of the challenge in international R&D&I landscape* and *Cooperation* while less so for *New global expertise needs* and *Impact of developed R&D&I in public and industrial agendas* and *Resilience* (new potential alternative solutions). This may induce some hurdles in stepping forward *towards new R&D&I domains.* This axis addresses mainly the evolution of knowledge and the concurrent evolution of the *Topic* itself.

While addressing the adequacy of JPI as collaboration form, there is still some lack of information on the full innovation chain.

Figure 4.2.1.Axis IG3 Criteria – Axis Topic

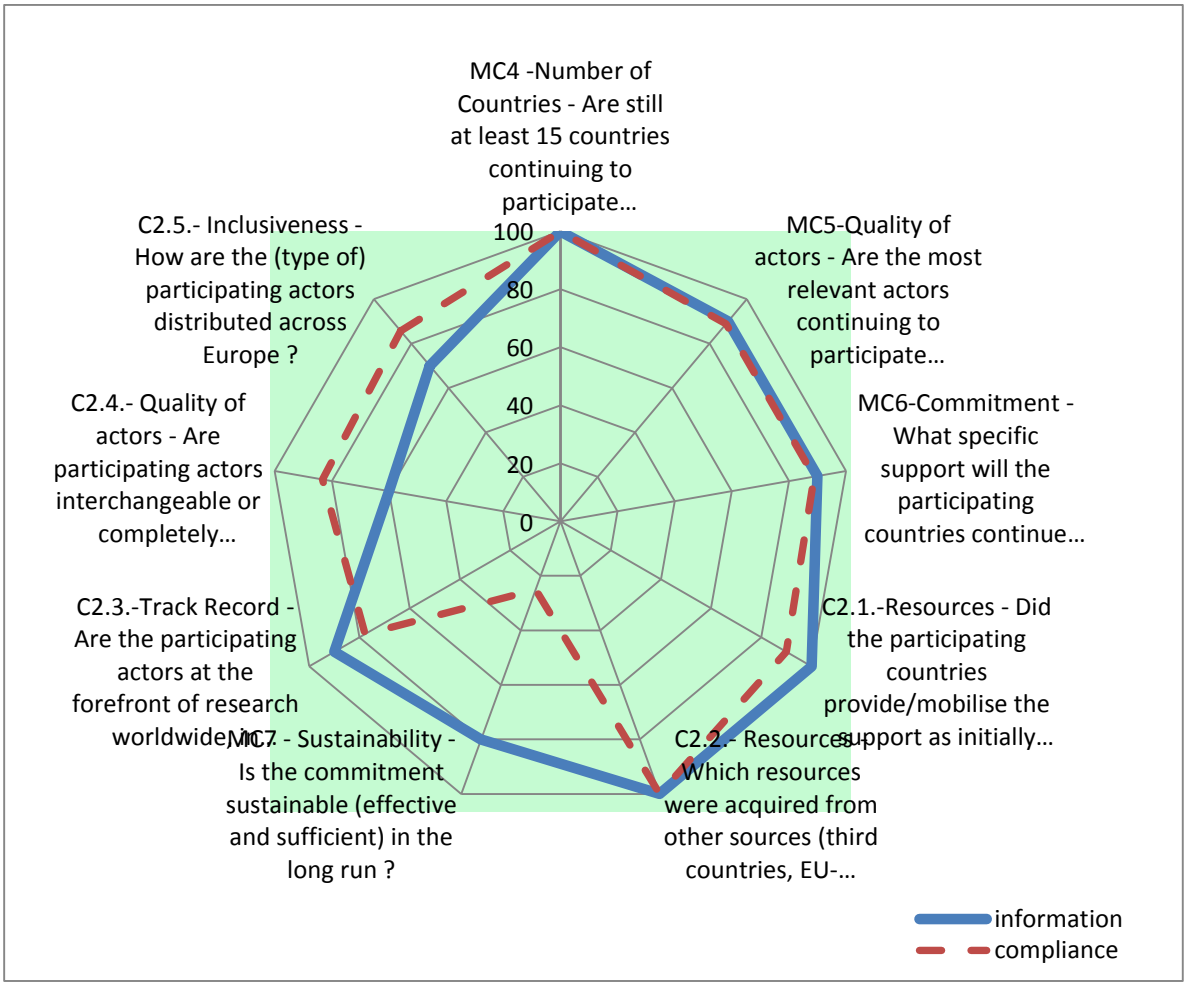


Nevertheless, the conviction of the analysts point to a full, or near to full (over 80%) Compliance (red dashed line) with most of the criteria, within the segment of JPIs with a Y[es] for satisfying available information (blue continuous line). So, the results show a good pattern for Compliance on this segment of JPIs, while Compliance on the segment with a N(o) for Information) remains unknown.

According to Figure 4.4.2, Engagement, a similar pattern for information and compliance emerges again, except for the criterion on *Critical mass - Commitment sustainability*, where the conviction on compliance is notably low, in spite of a considerable amount of information (Figure 4.4.2, Engagement).

The LTS present good levels of information and compliance for *Critical mass*, *Number of countries, Quality of actors* (the most relevant and representing the quadruple helix), C*ommitment* (guaranteed specific support from countries) and *Resources*. However, *Sustainability of commitment in the long run* stands out as a problematic issue across the board, as mentioned.

Figure 4.2.2.- IG3 Criteria – Axis Engagement



Other criteria regarding *Engagement*, as *Robustness* – on *Quality of actors* - and as *Coverage* – on *Inclusiveness*- also display low levels for Information while Compliance shows a stronger pattern on these criteria (above 80%), for the segment of JPIs with a satisfying level of information (60%). Sustainability of the commitment (MC7) stands out with only 25% for Compliance.

The *Quality of actors* category aims at positioning the JPI (in this report "as described in the LTS") within an interval of a few core actors (researchers, companies, other) without which the JPI would not be able to function anymore, and the other extreme, when each task or activity of the JPI can be covered by more than one actor (which may risk resulting in internal competition but at the same

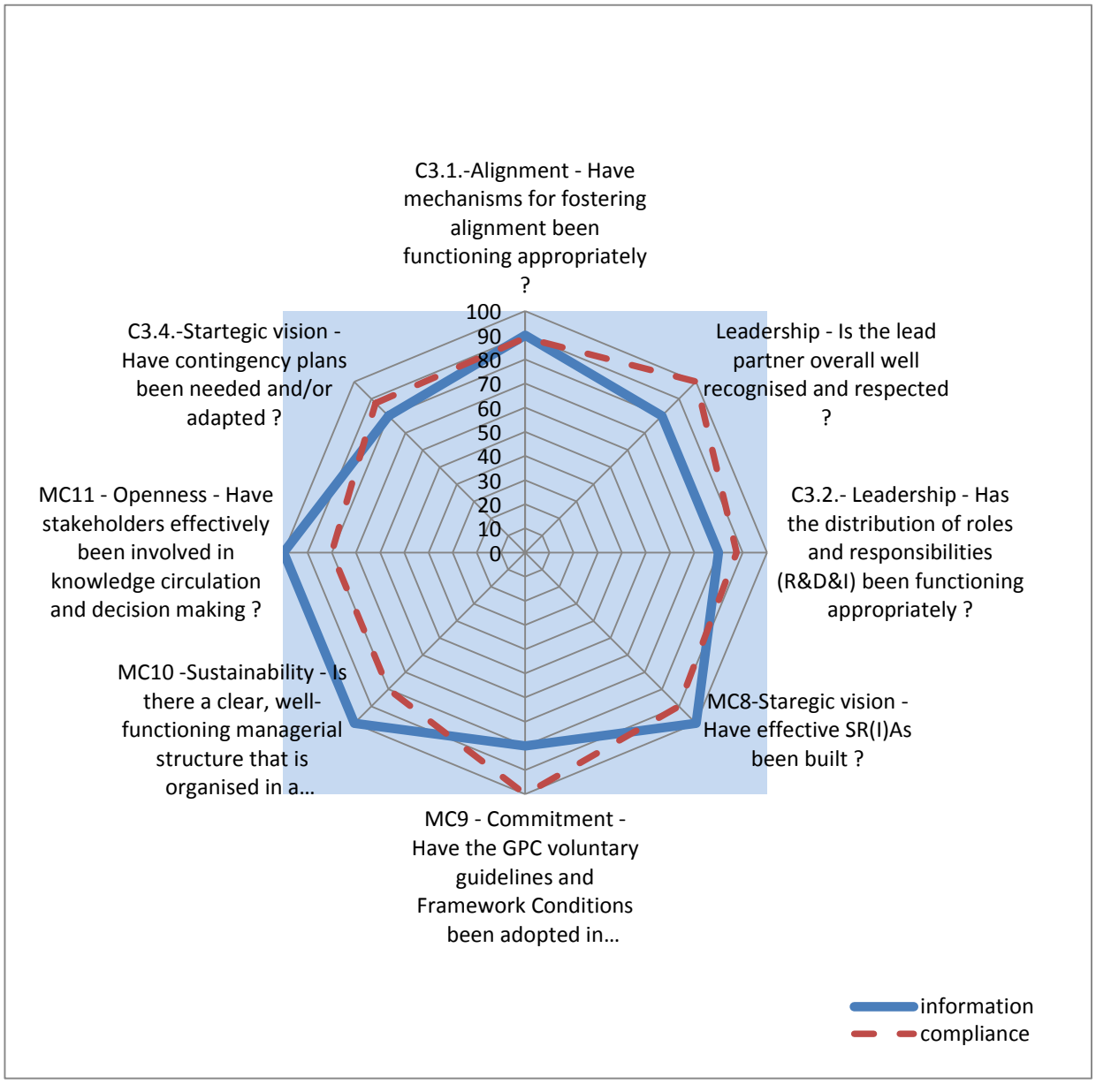
time makes the JPI robust and non-sensitive to actors leaving the network). The basic question is if the JPI, as described in the LTS, is robust enough (is the knowledge and expertise well distributed) to cope with a withdrawing country or other funder and hence the actors and their expertise covered by this funder. The focus here is not on funding but on the knowledge and expertise from actors supported by a funder.

Under the criteria *Inclusiveness*, the idea is detecting possible bias on the regional pattern of knowledge distribution, not (only) in the perspective of the participating countries, but mainly on how the actors are distributed within Europe (information as number of participants per funding country or distribution of funders over calls). New countries are mentioned as partners, but there is no systematic information on their knowledge profile or specialisation. This is understandable since this was never part of the outline for the LTS. However, this may constitute a valuable potential later addition.

Concerning the Axis *Governance* , a balanced general pattern of information and compliance on the criteria emerges from the analysis (Figure 4.4.3 on Governance).

Mechanisms to foster alignment and *Effective SRIAs* are perceived as strong features that may translate into higher value added standards and maturity fuelled by strategic vision.

Figure 4.2.3. - IG3 Criteria – Axis Governance

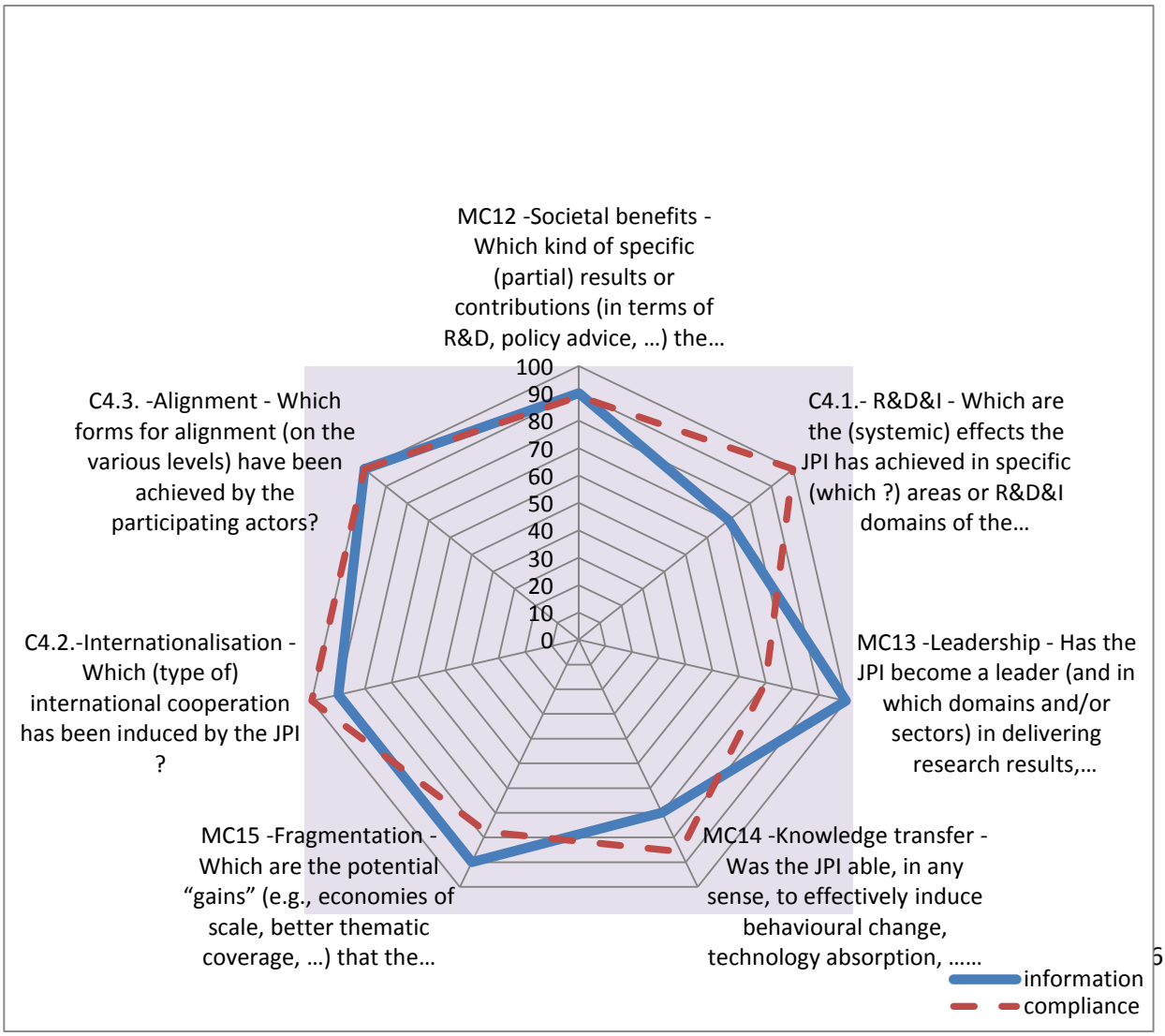


The *Openness* to stakeholders through an effective involvement in knowledge circulation and decision making is also a relevant driver for robustness of governance. This criterion means what "structures" or mechanisms allow stakeholders to have an effective involvement in decision making, integrated in the governance (user forum, stakeholder board, integration of the stakeholder concerns the SRIA).

Compliance is mildly stricter in this last criterion, as well as in managerial structures and sustainability – in spite of the adequate levels of supplied information.

As regards *Results, Outcomes and Impacts* (Figure 4.2.4.), *International cooperation* and *Alignment* stand out as strong areas, both entailing important structuring effects in the system, in particular in defragmentation. Multiple forms of alignment could be observed along the JPIs LTS, as calls, MoUs, tailored agreements, innovative strategies for (sharing of) infrastructures, tools to support international research activities, co-planning actions, programmes harmonisation, and promoting open access.

Figure 4.2.4.- Axis IG3 Criteria – Results, Outcomes and Impacts



In turn, international cooperation was also densely documented in the JPI´s LTS, in terms of membership and engaging with international organisations, sharing infra structures and data base projects, addressing knowledge gaps, promoting knowledge hubs on emerging areas, training and capacity building, among others with third countries. In fact, *Alignment* and *Internationalisation* evidence full (or near to full) levels of Information and Compliance, while Fragmentation (economies of scale, better thematic coverage achieved) is still lagging behind.

Compliance regarding C4.1.-*Systemic impacts in specific R&D&I domains and MC14*- Knowledge Transfer *Inducing behavioural change and Technological absorption* (87,5% to 100%) unveils a considerable degree of efficiency only within JPIs with satisfactory Information on the criteria (only 70%), while more information would be needed for an accurate global picture. *Structural impacts in the European and national R&D&I systems* regard the emergence of new scientific areas, new relations between actors inside the ecosystems, more collaborations between ministries, intensification of networking, and enlarging the knowledge bases of the system.

Together with MC11- *Involvement of stakeholders in knowledge circulation and decision making* – which still unsatisfactory- these criteria target the pattern of the JPIs activities (whether still too fundamental and with still limited involvement in innovation). One of the key/foundational elements for a JPI is developing activities along the whole innovation cycle, as mentioned above, in order to effectively impact the global challenge.

As far as leadership is concerned (MC13), in spite of the optimal levels of Information, there was not a general conviction on the basis of the JPI LTS on the role of the JPIs as global leaders (still under satisfactory).

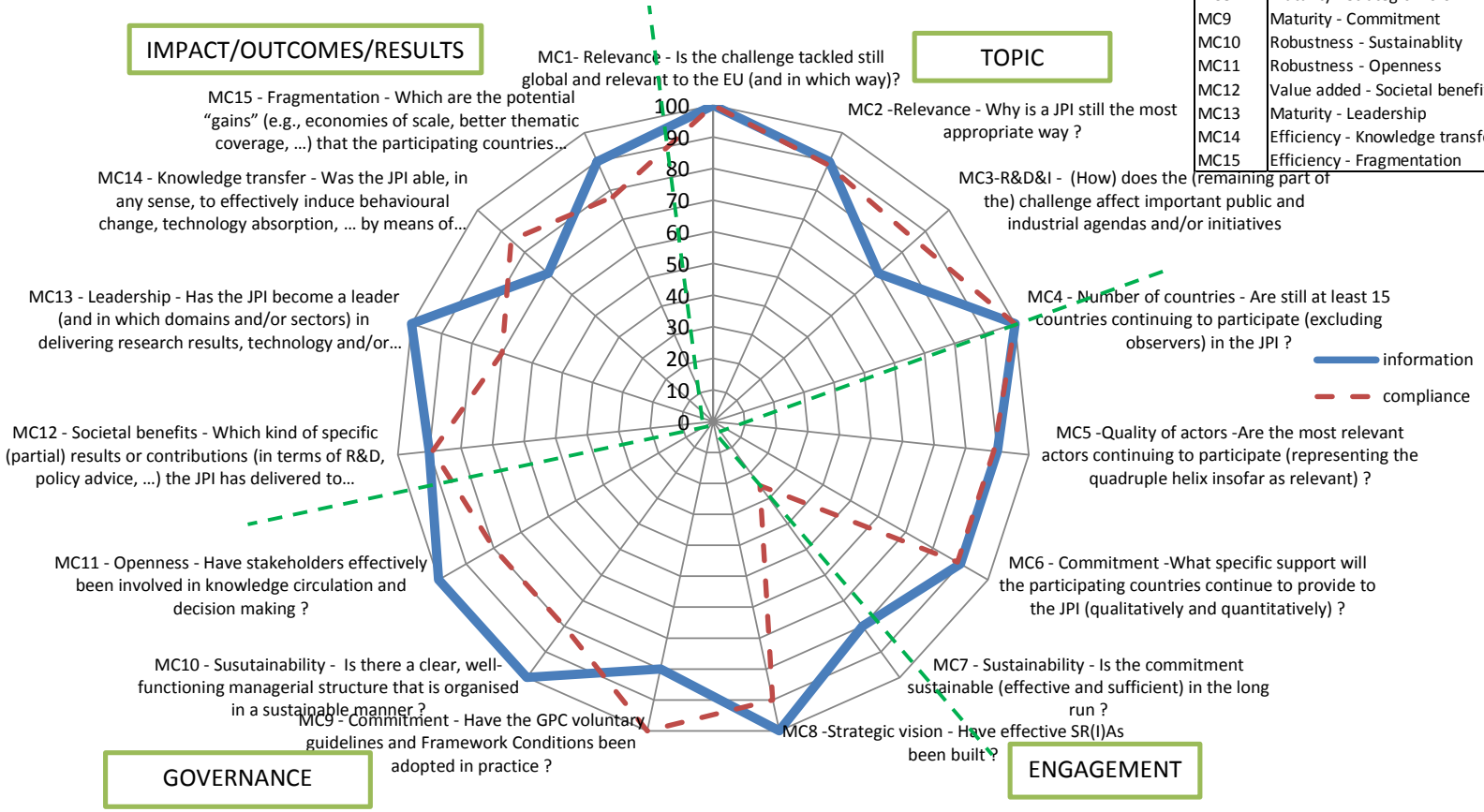
Finally, *Societal impacts* (MC12) account for a good level of Information and Compliance. Nevertheless, this analysis perception on impacts was mostly built on early impacts and rarely on more mature actual impact addressing the challenge, as already mentioned.

4.3 Results - IG3 Minimum Conditions

The set of minimum conditions (MC) constitute the core of the quality control instrument created by IG3 – Monitoring and Evaluating JPIs, and in the overall assessment procedure JPIs should not fail them. This prompted a more detailed investigation of the general grading of MCs in this analysis.

Figure 4.3.1 – IG3 Minimum Conditions Profile: information and compliance

MC		INFO with a Y grade		COMPLIANCE with a Y grade	
		% JPI	Number JPI	% JPI	Number JPI
MC1	Value Added - Relevance	100,0	10	**100,0**	10
MC2	Value Added - Relevance	90,0	9	88,9	8
MC3	Focus - R&D&I	70,0	**7**	85,7	**6**
MC4	Critical mass - N. of Countries	100,0	10	**100,0**	10
MC5	Critical mass- Quality of actors	90,0	9	88,9	8
MC6	Critical mass - Commitment	90,0	9	88, 9	8
MC7	Critical mass - Sustainability	80,0	8	**25,0**	**2**
MC8	Maturity - Strategic Vision	100,0	10	90,0	9
MC9	Maturity - Commitment	80,0	8	**100,0**	8
MC10	Robustness - Sustainablity	100,0	10	80,0	8
MC11	Robustness - Openness	100,0	10	80,0	8
MC12	Value added - Societal benefits	90,0	9	88,9	8
MC13	Maturity - Leadership	100,0	10	70,0	**7**
MC14	Efficiency - Knowledge transfer	70,0	**7**	85,7	**6**
MC15	Efficiency - Fragmentation	90,0	9	77,8	**7**



Note:

The general profile of the minimum conditions (MC) is shown in Figure 4.3.1, and a few conclusions could be stressed:

- Full information (100%) is observed for 6 out of 15 MC´s (40%) across all JPIs– namely on MC1, MC4, MC8, MC10, MC11 and MC14, addressing the Value added/ Relevance (Topic), the Critical mass/Number of countries (Engagement), the Robustness in the perspective of both Sustainability and Openness (Governance) , and finally the Maturity/Leadership (Results, Outcomes and Impacts).
- Full compliance (100%) is found in only 3 of the 15 MCs (20%) across all JPIs – involving MC 1, MC4 (Relevance and Critical mass) and MC9 (Commitment to voluntary guidelines)
- Full information and full compliance is obtained for 2 MCs (13,3%) across all JPIs– MC1and MC 4
- A N(o) grade for information and/or compliance for at least 1-3 MCs occurs with 80% of JPIs, suggesting that JPIs are still in a sub-optimal position, still immature in some sense and not delivering as hoped for, and would probably not pass if really submitted to the quality control mechanism.
- General satisfying high information for most of MCs (above 80% of JPIs), except for MC 3 – Focus/ R&D&I and MC14 - Efficiency – Knowledge Transfer (70% of JPIs), requiring further information for a real picture on compliance, namely on the innovation cycle perspective
- General high compliance (above 80% of JPIs) for most MC´s, including on MC3 and MC14 within the segment of JPIs that supplied enough information (even if further information is required for a full judgement, as mentioned
- To be noted that MC7 – Critical mass – Sustainability and M13 - Maturity- Leadership, are still less than optimal, being critical in the first case (only 25% of JPIs comply).

Beyond this general picture of MC, a breakdown for the four JPI LTS with the highest number of Y(es) and the four with the lowest number of Y(es), respectively, was conducted, in order to capture and compare diversity within the set of 10 JPIs (Figure 4.3.1.) (further information in Annex 5, chapter 7.5).

In terms of provided information, the two profiles are quite similar and follow the general pattern. There is highly satisfactory content (80% of JPIs in each considered segment) for most of the minimum criteria, except for the MC3 (on the *impacts of the challenge in public and industrial agendas*) and the MC14 (on the *behavioural and technological change by adequate knowledge transfer strategies*). –although more severe for the less compliant group.

Therefore, some sharp diversity can be identified in compliance, namely as regards MC2 (Relevance – Why is a JPI the most appropriate way?), for MC5 (Quality of Actors - Are the most relevant actors continuing to participate (representing the quadruple helix insofar as relevant?) and for MC14 (Knowledge transfer), to the detriment of the lowest graded. To be noted that, in contrast to the more compliant, the lowest segment of JPIs observes a full compliance with MC3 (R&D&I), indicating significant interest of public and industrial agendas of the theme, in spite of the low levels on knowledge transfer.

The main common concerns on compliance are focused for both segments in long term commitment and leadership 3.3.5.

Figure 4.3.2: IG3 Minimum Conditions Profile (MC1 to MC15) in terms *of information*: all JPIs (blue curve), 4 more compliant (thick green curve) and 4 less compliant JPI (blue dashed curve)

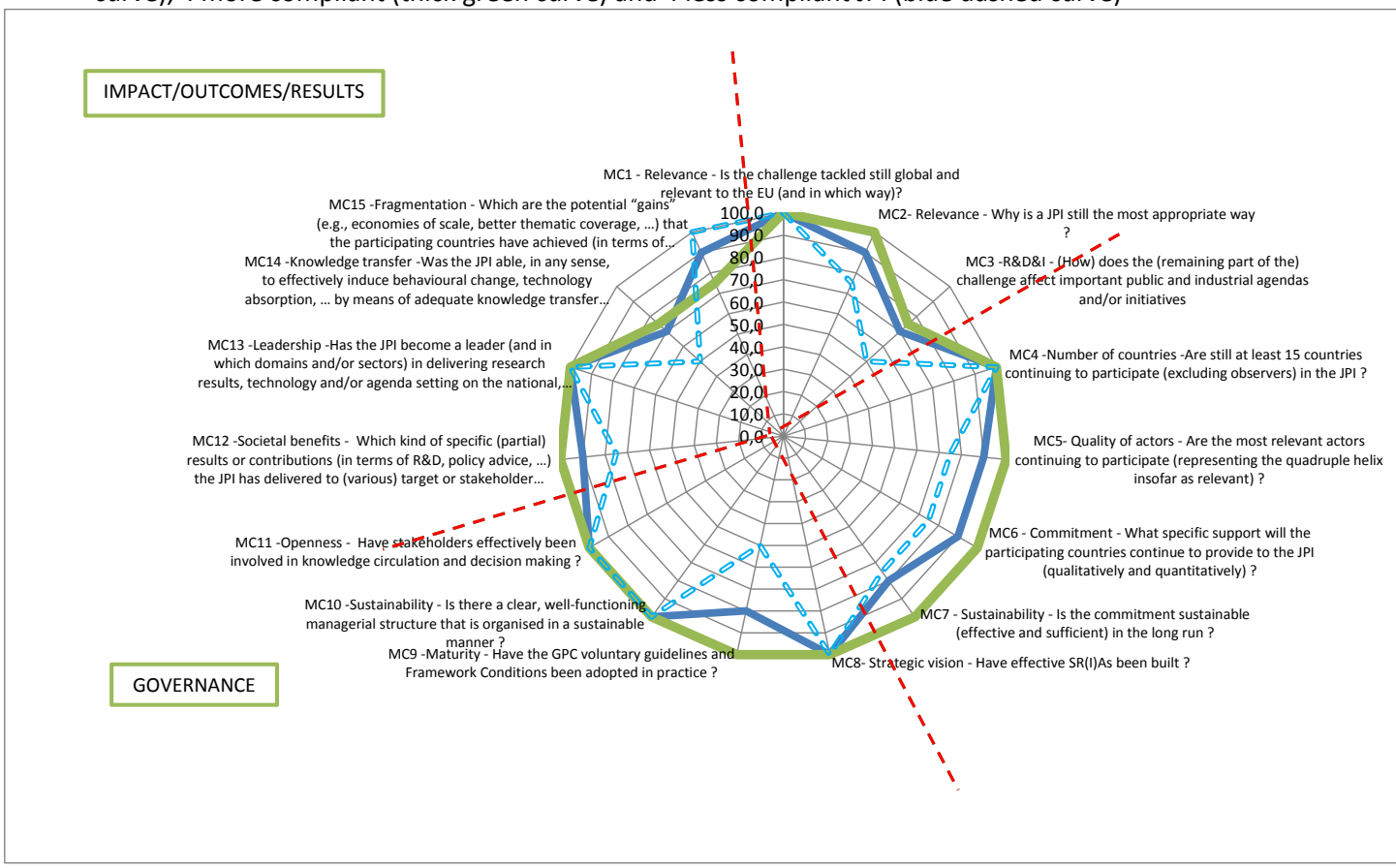
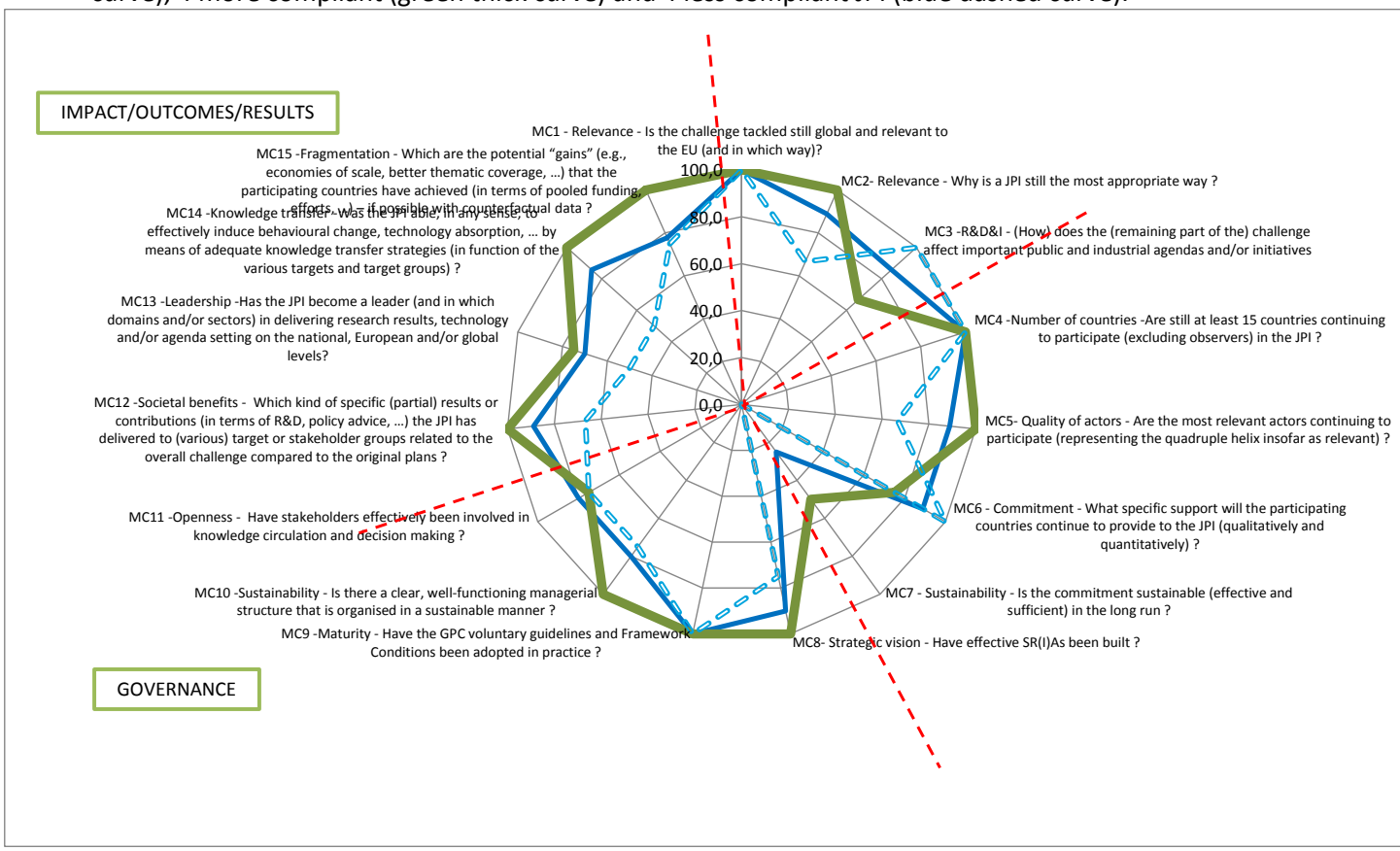


Figure 4.3.3: IG3 Minimum Conditions Profile ((MC1 to MC15).) in terms *of compliance*: all JPIs (blue curve), 4 more compliant (green thick curve) and 4 less compliant JPI (blue dashed curve).



4.4 Results - Approach to the criteria defined by the ERAC ad-hoc WG on Partnerships -Council Conclusions 2017

Having in mind the Mandate of this TF stated in Chapter 2.1 and the discussions on analysis repeatability and the mission-oriented approach of JPIs in the remit of the March 2018 GPC meeting it may be timely and appropriate to analyse how JPIs perform on the bases of the main principles defined under the Council Conclusions (CC) of 1 December 2017. These guidelines principles follow the fundamental principles of the future Framework Programme as outlined in the Council Conclusions. According to the ERAC Ad-hoc Working Group on Partnerships Recommendations[5], tentative definitions were laid down, encompassing the following dimensions: *EU Added value*, *Transparency*, *Openness*, *Impact*, *Leverage effect*, *Long term financial commitment of the involved parts*, *Flexibility*, *Coherence* and *Complementarity*.

Here follows a suggested correspondence between these definitions and the IG3 criteria:

[5] Recommendations on the criteria for selecting, implementing, monitoring and phasing out of R&I partnerships" approved in last ERAC Meeting (17 of May).

EU Added value → the dimension "value added" in the various axes

Long-term financial commitment of all the involved parties → the dimension "Engagement > Critical Mass"

Transparency → the criterion "Governance > robustness > openness

Openness → the criterion "Engagement > coverage > inclusiveness"

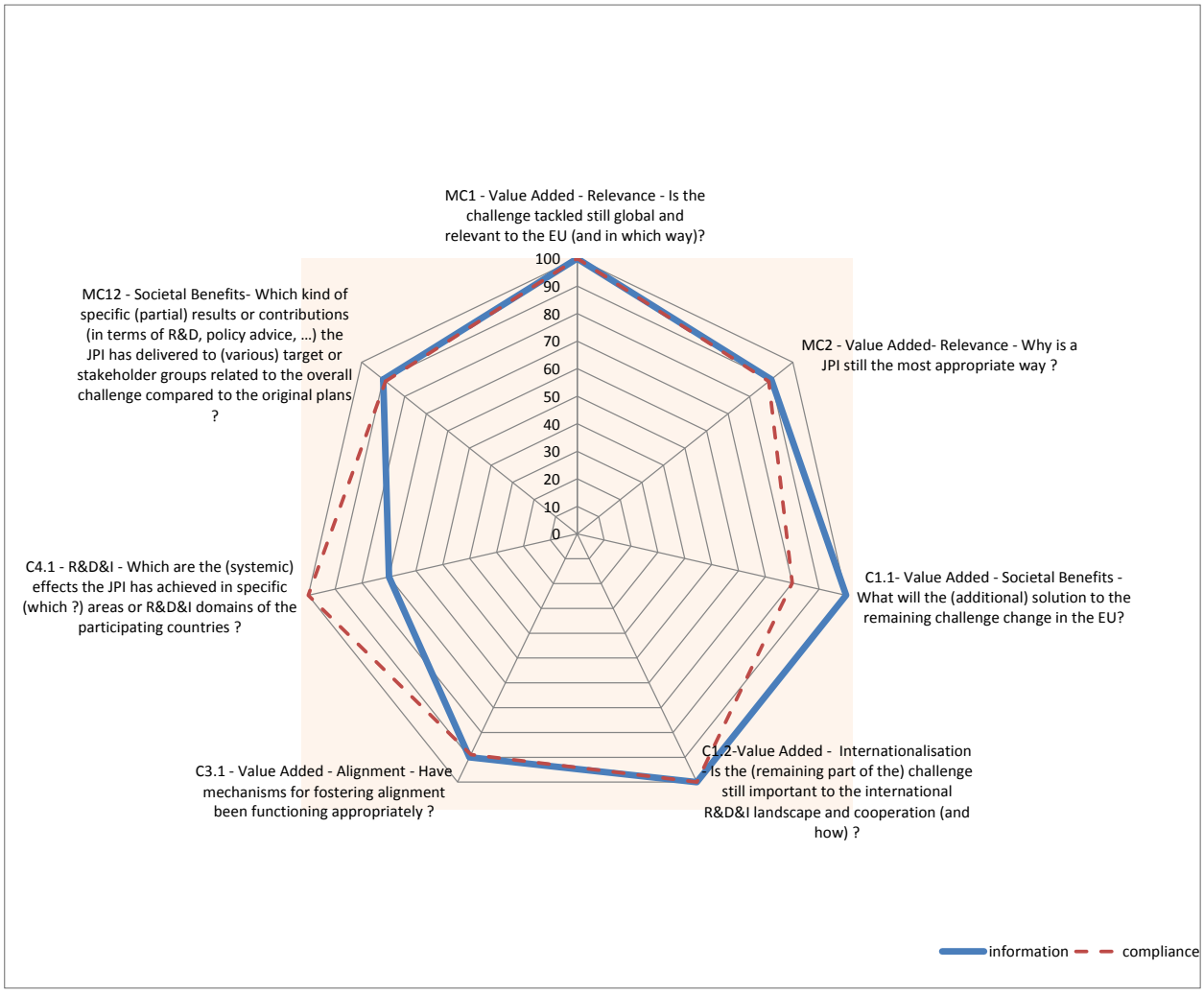
Flexibility → the facet "Resilience" and/or the dimension "Robustness" in the various axes

Impact → the axis "Results"

Leverage effect → the criterion "Results > Efficiency > Fragmentation"

(see Annex 1, chapter 7.1.5)

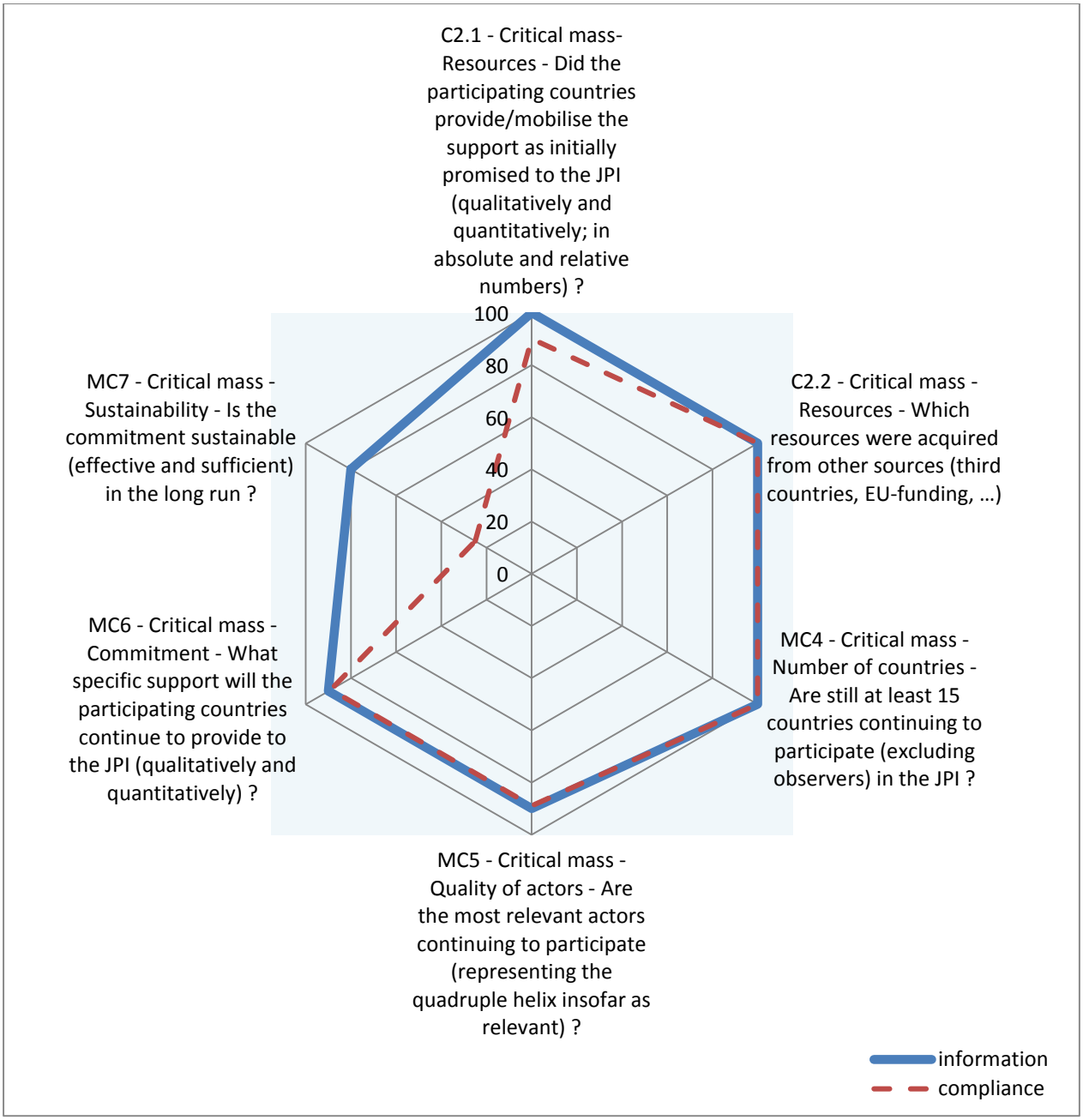
Figure 4.4.1.European Added value



According to these principles, Partnerships will be limited to areas of high European added value and relevance for agreed European political priorities, and should clearly demonstrate delivery of results for the EU and its citizens, notably global challenges and competitiveness, that cannot be achieved by the Framework Programme alone.

Generally, compliance is optimal or highly satisfactory in most of the relevant criteria, thus placing JPIs in a quite advantageous position on what concerns EU Value Added in this partnership context. As previously mentioned, the whole set of IG3 criteria on impacts was cautiously applied. In general, very early impacts were considered, even if still far from having a clear impact on the challenge-at-hand (Figure 4.4.1). Also a better level of information would be required for a full assessment on compliance on the R&D&I criterion (effects on R&D&I systems and ecosystems - areas, domains, actors…) since only 70% of JPIs supplied enough information.

Figure 4.4.2 Long Term Commitment



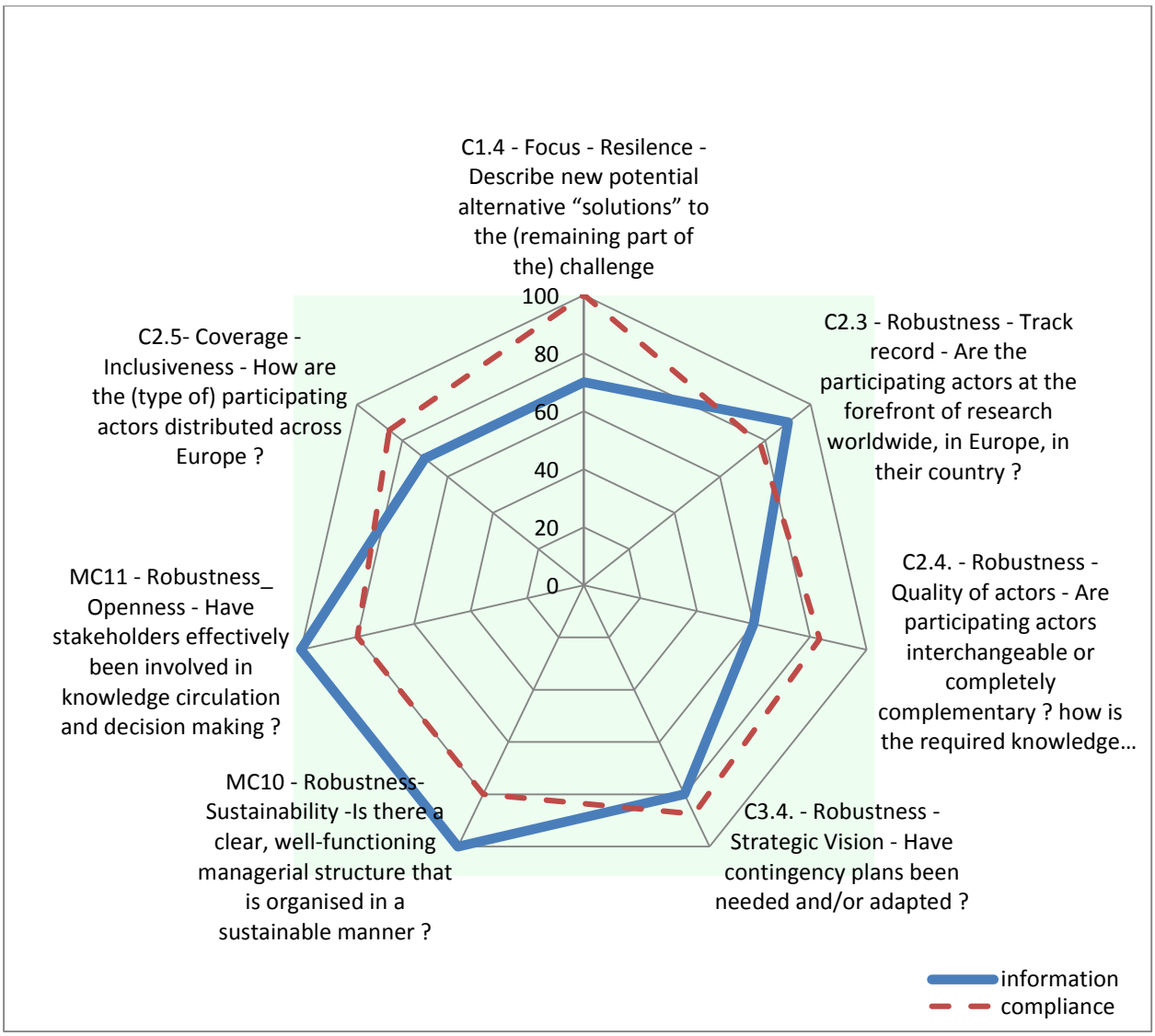
The critical point is sustainability of commitment, which should be effective and sufficient in the long run. The JPI LTS bare witness of a certain degree of fragility for this dimension. According to the CC principles, endured commitment over the life-cycle of the R&I partnership (including adequate human

resources) is a core indicator for ensuring the political and/or industrial relevance of the R&I partnership.

Other important CC dimensions regard to flexibility, transparency and openness.

Concerning flexibility (*Resilience and Robustness* criteria, Figure 4.4.3.) an uneven pattern on information and compliance is demonstrated. Compliance is highly satisfying within the JPIs with enough information in most of the criteria. However, a weaker pattern in terms of information is observed with regard to *Quality of actors* – and the profile of *Interchangeability or complementarity of actors*, and *Expertise distribution over actors and countries*/funders. Strong evidence was patent in the LTS for *Track record of participants, Strategic vision* and *Sustainable well-functioning managerial structures*.

Figure 4.4.3. - Flexibility, Transparency and Openness,



Transparency in the process of identification, selection and monitoring by the EU and MS, but also in the implementation and use of results is mostly accounted for by effective involvement of stakeholders in

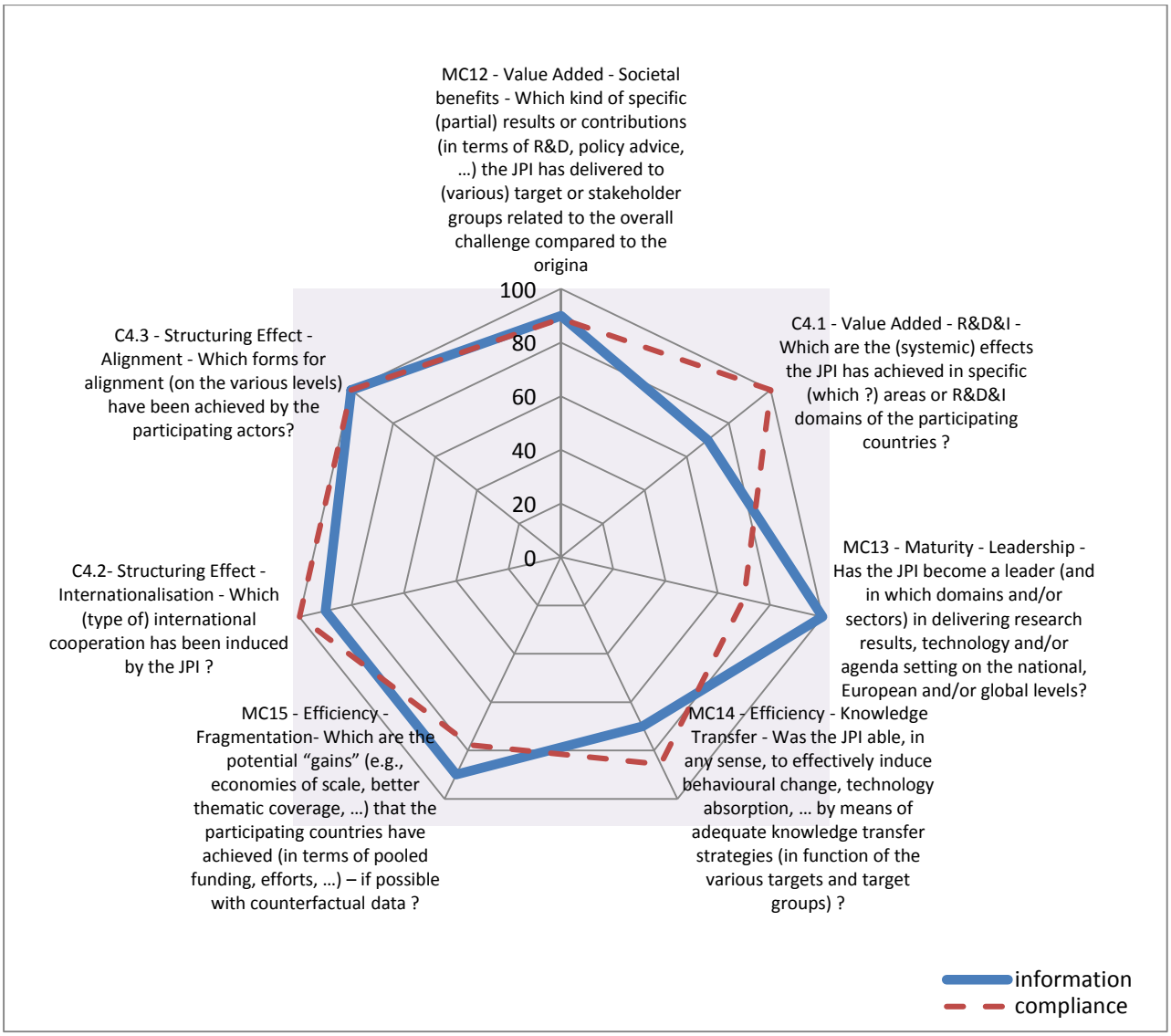
knowledge circulation and decision making, a criterion where the LTS display a high level of available information and compliance.

Finally, the criterion Coverage – Inclusiveness is to a certain extent a weak point in terms of information Nevertheless, compliance is considered highly satisfying, even if information should be refined and refer not only to participating countries, but also to the distribution of actors (stakeholders, not necessarily funders or countries) across Europe and worldwide. Openness and removing barriers to participation with respect to the priority setting and to the dissemination and access to results, is an important CC principle.

The Impact principle is addressed by the criteria under the axis *Results, outcomes and impacts* (Figure 4.4.4). According to the CC principles, R&I partnerships should have clear structuring effects and provide visible alignment and directionality of public and/or private R&D investments (qualitative / quantitative leverage).

In general terms, all criteria demonstrate an optimal to highly satisfying grade of compliance. However, as previously mentioned, MC14 - Knowledge transfer is a weaker criterion in terms of information, together with the criterion on Systemic R&D&I impacts – being required more information for an accurate picture. MC13 - *Maturity- Leadership* substantiate *a* main concern in terms of compliance.

Figure 4.4.4.Impacts and leverage effects



In line with the above picture, structuring effects produced by alignment and internationalisation are well represented in the LTS. This is true to almost the same extent for *societal impacts* and *impacts on fragmentation*. Thus JPIs seem to score well in this CC principle, even if awareness should be raised again regarding the fact that very early impacts were considered.

5 JPI collaboration patterns

5.1 Rationale

The LTS provide an opportunity to assemble data on JPI collaboration partners. The TF gathered this information as part of the LTS analysis. Combining the data of all 10 JPI LTS allowed for a quite novel analysis of networks. To increase the value of the result of this analysis, the JPIs were engaged to provide the TF with complete, up to date, categorised lists of collaboration partners. These 10 updated data-sets are the ones used for the analysis displayed in chapter 5.1. Thus, this constitutes the only part of this report that builds on more information that what is included in the LTS texts.

The Final Report of the Expert Group on "the Evaluation of Joint Programming to Address Grand Societal Challenges", also known as the Hernani Report, recommends that *the JPIs should be strategic hubs or platforms for research and innovation in their respective challenge. Such an undertaking needs to be developed over time, built in an environment of trust* and commitment and using new forms of collaboration" (section Working Groups, page 17)

In addition, the final Report by GPC/IG3 on "Monitoring and Implementing JPIs" states:

"*One of the major challenges to be addressed in the coming years, after the basic conceptual issues were settled (relevance, scope and meaning of alignment), is improving the* ***interaction*** *between the JPIs and other relevant bodies acting in this area. The GPC's task of acting as* ***a strategic hub*** *or platform for participating countries, where trust must be built and evidence provided for political decision making, comes out as a fundamental target. By acting as an* ***intermediary*** *between politics, policies and practice, the GPC should contribute to* ***reducing unnecessary fragmentation and duplication of research initiatives and improving connections between initiatives***.

Another assignment of the GPC is to ensure that the implementation of the ERA is taken into account when developing national strategies to facilitate transnational cooperation, enabling a favorable environment for multilateral cooperation and contributing to the further implementation of the ERA - in accordance with the ERA-related groups, in particular the SFIC, and the "open to the world" policy of the Commission

This section aims at a broad insight into the collaborations of JPIs, in order to document the density and diversity of these interactions within different layers and actors of the RDI landscape.

Two main approaches were followed: a first approach centred on the perspective of the JPIs and their selected universe of collaborations, whereas the second approach focused on the "system", and all the present JP initiatives and instruments in the fields where the JPIs are active- and where the selected collaborations by JPIs intersect. Both approaches may contribute to a visualisation of the JPP landscape. The latter also adds a perception of the current JP potential instruments and collaborations, as well as

the position of the JPIs in the field 1) as a leader/large scale/ long term instrument, and 2) in the innovation cycle, more rooted in fundamental research collaborations or more innovation led ones; [6].

In the first approach, several segments were considered in a systematic way:

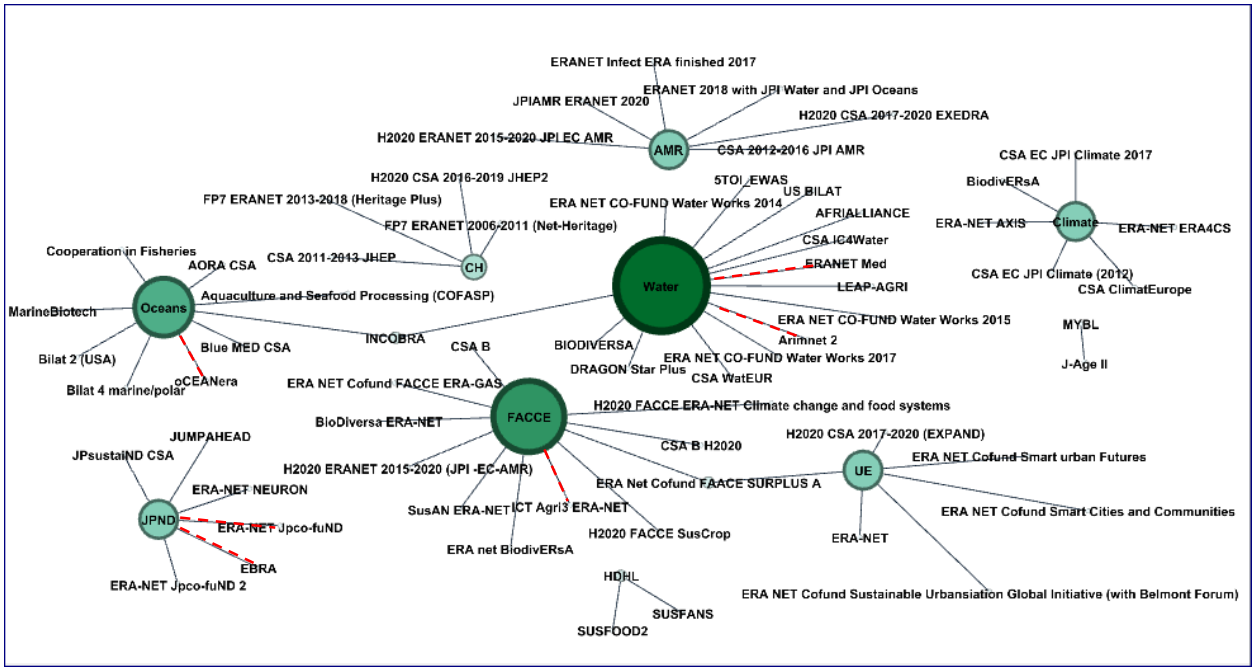
- transnational interactions (within Europe): implementation, transversal (with other JPIs, articles 185, other), regulatory/industry interactions, vertical, interactions with European infrastructures
- global interactions: political and policy driven, RDI performer, RDI promoter/funder, regulatory/industry, global infrastructures
- international/regional interactions: political and policy, RDI performer, RDI promoter/funder, regulatory/industry; regional infrastructures

For the second approach, we considered as more pertinent the following subset of networking compiled in the remit of the ERALEARN clusters[7] "Food, Agriculture and Fisheries", "Environment" and "Health", given the thematic fields of the 10 JPIs.

In general, concerning the network charts, the lines represent the existence of a collaboration (effective/potential) and the nodes the intensity (number of collaborations, regardless of their nature). The shared nodes represent the shared initiatives/forums, suggesting that these are critical points for the JP phenomena. Red dashed lines refer to potential collaborations. Green lines mainly refer to effective collaborations.

5.2 Results –The JPIs perspective

Figure 5.2.1 - Implementation



Note:

[6] This second approach was based on the mentioned information by the JPIs and on the information by ERALEARN, organized by domain thematic areas or "clusters", available at (ERALEARN tool)

[7] ERALEARN information on JP instruments is organized according to "thematic clustering on ERA Initiatives. Several "clusters" on past and upcoming networking are considered: Energy; Environment; Food, agriculture and fisheries; Government and social relations; Health; Information and communication technologies; Industrial production; Materials; Nanosciences and nanotechnologies; Security and Defence; Services; Socio-economic sciences and humanities; Space; Transport; Others

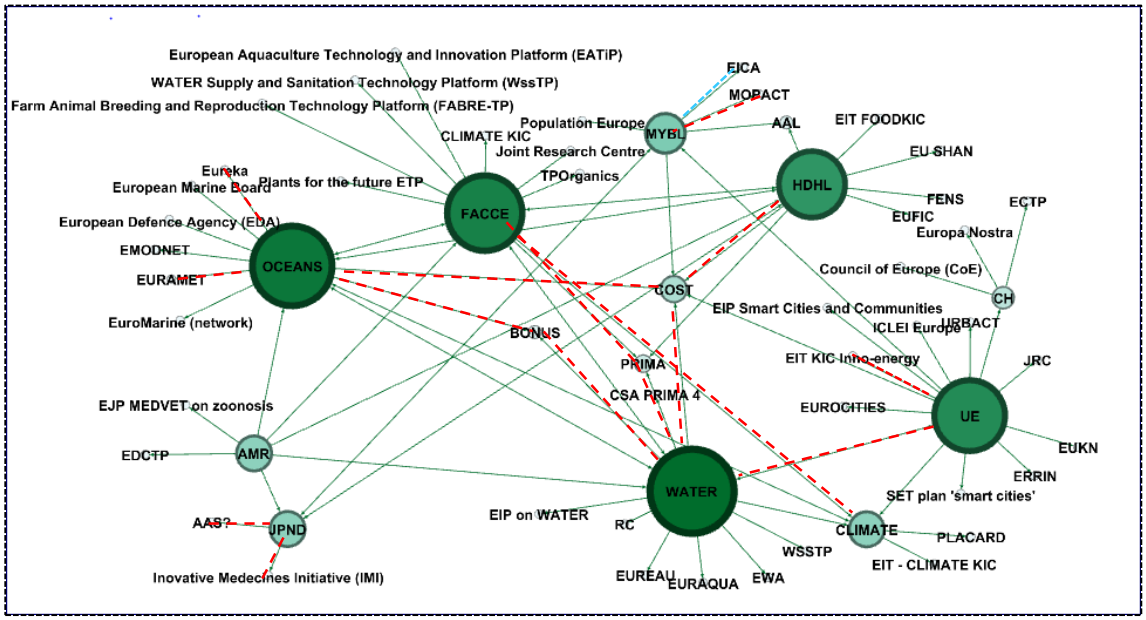
Red dashed lines: potential collaboration; Green lines: effective collaborations
The collaborations translate mainly into calls, workshops and visits, support to the steering board or to the advisory boards

The financial support from the EC (through CSAs and the ERA-NET instrument) has clearly been vital to the initial development of the JPIs. Perhaps more important has been the role of the EC in helping the JPIs to position themselves within both the European and international societal challenge landscape but some feel that "the Commission does not support the JPIs equally".(Hernani Report).

In fact, all JPIs benefitted from CSAs and from ERA-Nets (Figure 5.2.1. – Implementation), allowing for more sustainable operational activities (as the secretariat, mapping and forecast exercises, building and redressing SRIAs, among others), and also fostering the JPIs R&D&I activities. Beyond the financial contribution (through calls), the existence of several ERA-Nets in a domain translates into increased critical mass in that domain, favouring joint programing in general and, by this token, also JPIs.

Water, FACCE and Oceans stand out with a more dense set of these supporting instruments. It is interesting to note the phenomena of shared instruments, namely between Water and Oceans (INCOBRA) and FACCE and UE (ERA-Net CoFund FACCE Surplus A), clearly demonstrating interfaces between these challenges and a potential improved efficiency regarding joint programming. All collaborations are effective, except for just a few (6 collaborations scattered among the 4 most intensive JPIs), which are displayed in red.

Figure 5.2.2.- Transversal interactions



Note:
Red dashed lines: potential collaboration; Blue dashed line: exploratory phase; Green lines: effective collaborations
Collaborations nature: with other JPIs mostly encompass joint ERA-NET calls, planning joint actions, strategic discussions, workshops and conferences as well as joint papers; with Articles 185 regard to exchange of information, joint meetings and consultations, joint calibration of actions, common dissemination of calls; with Other transnational bodies: workshops engagement in development of strategic documents(as SRIAs) collaboration with the advisory boards and regular exchanges with selected network experts, and institutional partnerships, joint papers and agenda discussion. Contribution to the implementation of important EU policies (as SET plan "Smart Cities").

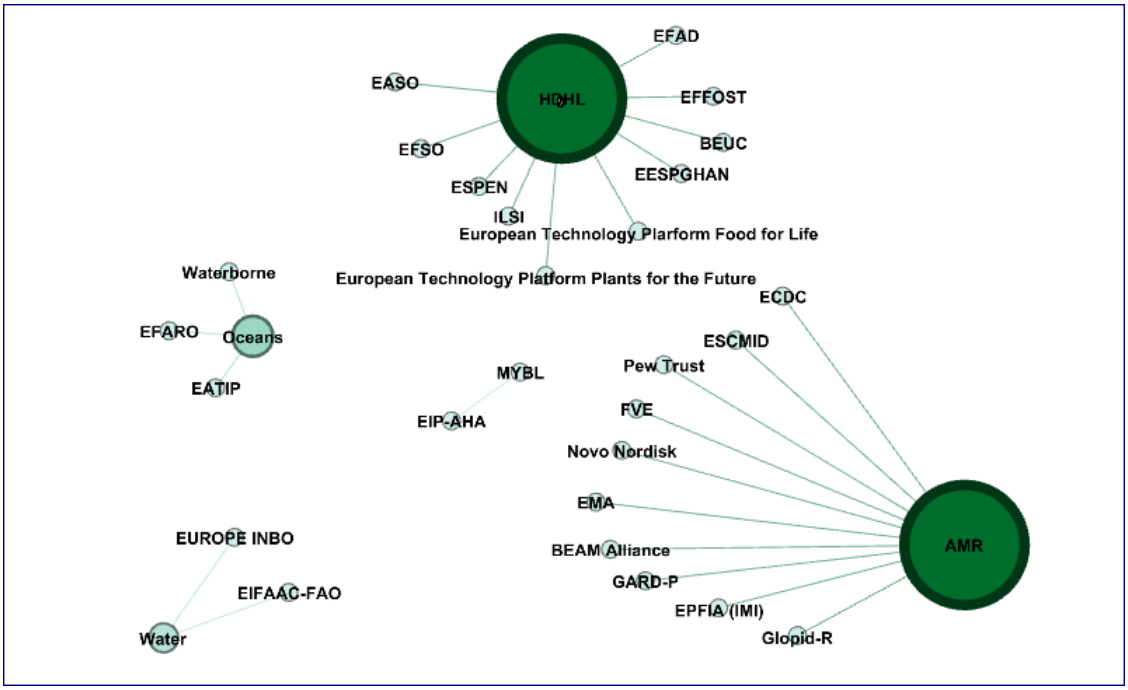
The interconnections among JPIs (Figure 5.2.2), show that some are exploiting synergies while engaging in joint actions in overlapping priorities or common stakeholders, translated either in joint calls and in

working together towards collaboration, with both, societal challenge stakeholders and international initiatives.

Furthermore, connections between JPIs and other JP instruments, such as Articles 185, and also with other European partnerships of a multiple nature, show their interest in positioning themselves within the European Societal Challenge landscape.

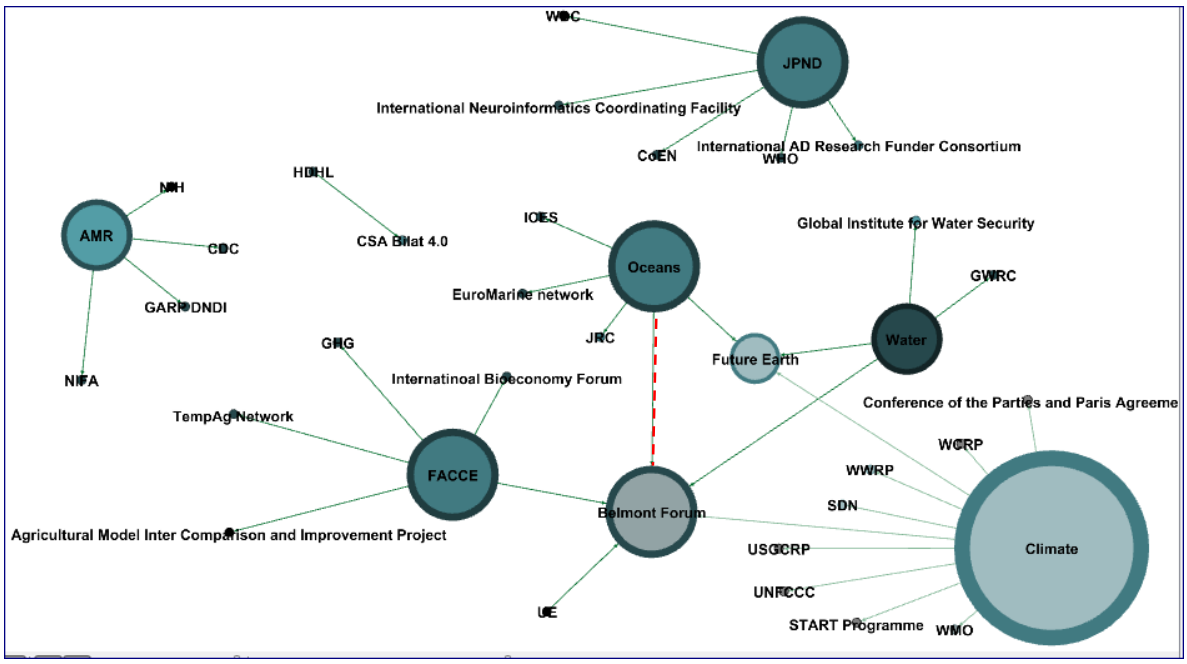
Water, HDHL, UE, Oceans and FACCE are the more prominent in the number of collaborations developed. Instruments as BONUS, PRIMA and AAL, and organisations/associations as COST should be mentioned, the latter two functioning as multi-connection nodes. Nevertheless, collaborations with Articles 185 (and COST) are still potential for the concerned JPIs (Oceans, FACCE, HDHL and Water). Likewise collaborations between JPND and IMI (Innovative Medicine Initiative), and between MYBL and MOPACT and MYBL and EICA (European Interdisciplinary Council on Ageing) are also not yet effective.

Figure 5.2.3.-Interactions with EU regulators, industry, end users



Note: Red dashed lines: potential collaboration; Pink dashed line: exploratory phase; Green lines: effective collaborations
Collaborations nature: global actors – regulators as stakeholders of the advisory boards, joint meetings and funding; transnational actors: joint regular meetings, institutional partnerships, conclusion of MoUs, data sharing,

Figure 5.2.4.-Interactions with global regulators, industry, end-users

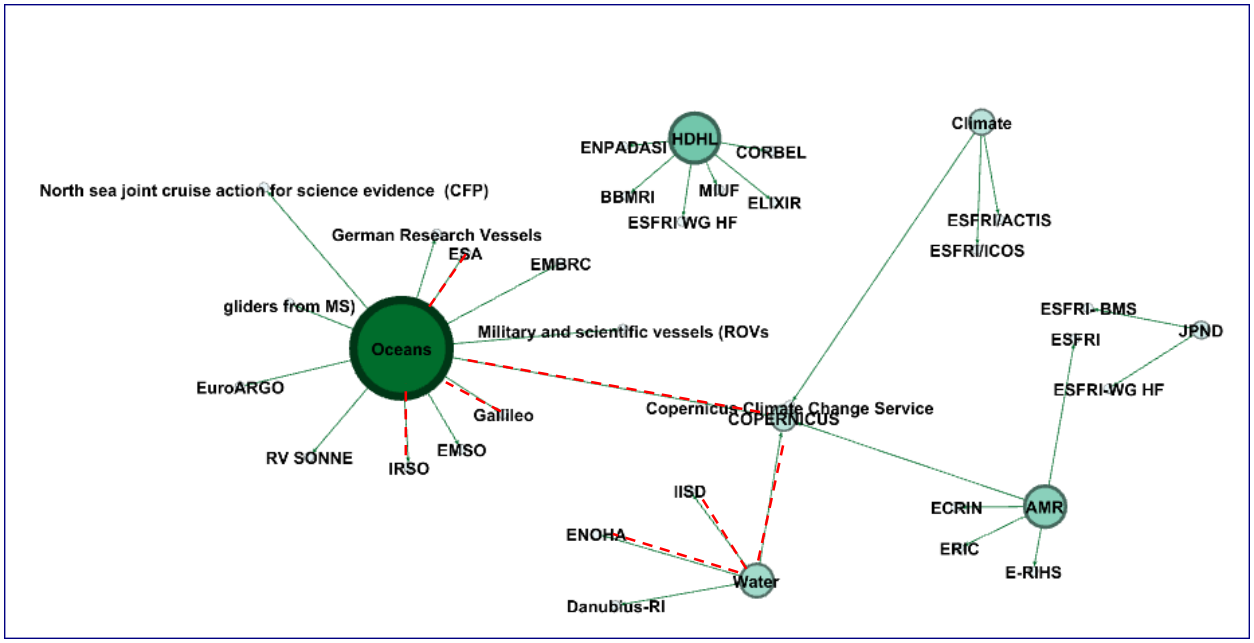


Note: Red dashed lines: potential collaboration; blue dashed line: exploratory phase; Green lines: effective collaborations
Collaborations nature: global actors – regulators as stakeholders of the advisory boards, joint meetings and funding; transnational actors: joint regular meetings, institutional partnerships, conclusion of MoUs, data sharing,

Interactions (transnational or international) with organisations and platforms of regulators, professionals, end users and industry has been pointed out as a general weakness of the JPIs, as perceived in the LTS (see chapter 3.3.2), and thus makes this graph extra interesting. Interconnections with this type of stakeholders signal a quadruple helix representation and supports inducing behavioural change and new technology absorption.

Regarding this kind of collaborations, and according to Figures 5.2.3.and 5.2.4, AMR and HDHL seem to be at a different level than the others for Europe, whereas Climate stands out as an active collaborator globally. Belmont Forum is quite nodal in the overall networking being shared with several JPIs, while demonstrating a still potential collaboration with Oceans.

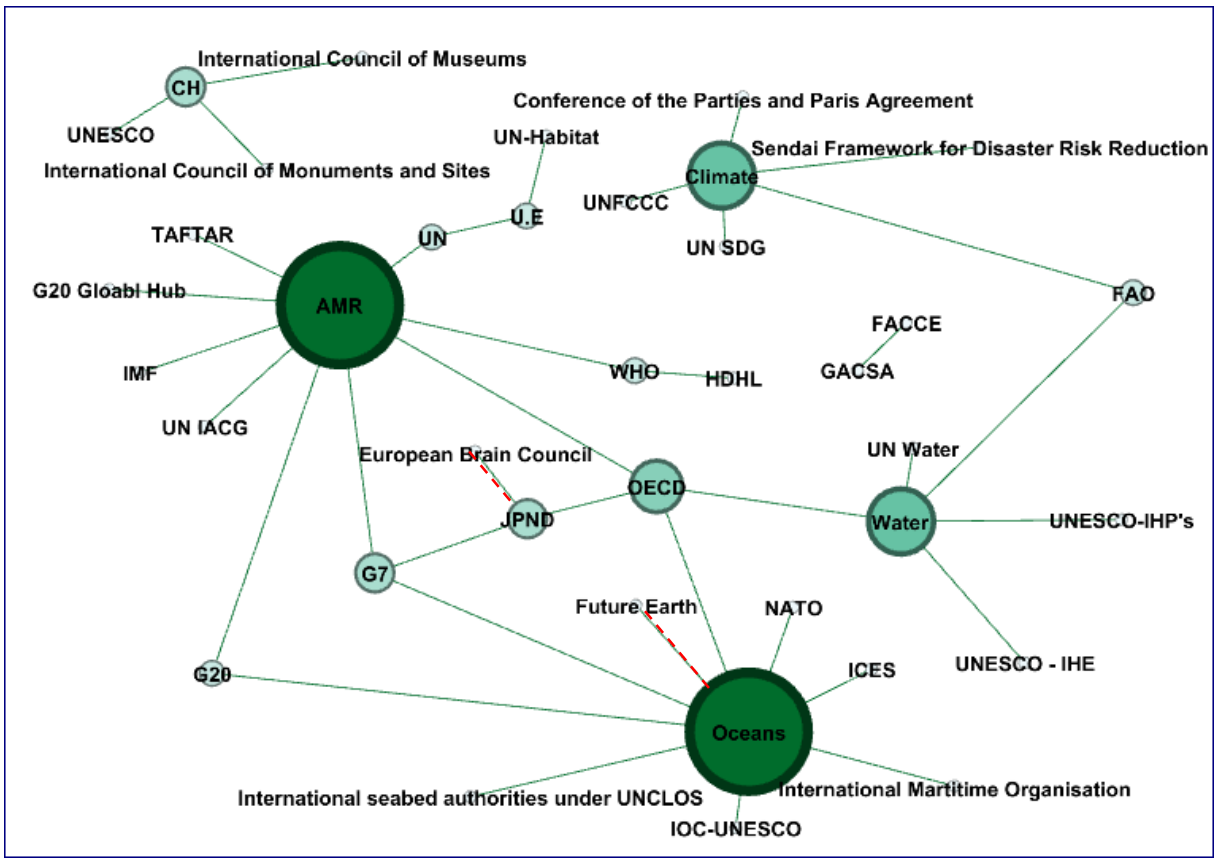
Figure 5.2.5.-Interactions with EU and global infrastructures



Note: Red dashed lines: potential collaboration; Blue dashed line: exploratory phase; Green lines: effective collaborations
Nature of the collaboration: capacity building; sharing of infra-structures and knowledge; stakeholder as part of the advisory boards

Sharing infrastructures, either within Europe or globally (Figures 5.2.5.), has been considered an important form of alignment, defragmentation and international cooperation. Infrastructures support capacity building and influence the structuring of research activities. HDHL, Oceans and AMR stand out with a wide range of interconnections with infrastructures. It is worth mentioning the infrastructure COPERNICUS, which is shared by several JPIs, as AMR and Climate, while still potential for Oceans and Water. These two last JPIs – Oceans and Water - reported other still potential collaborations as relevant for their future performance.

Figure 5.2.6.- Political/Policy collaborations

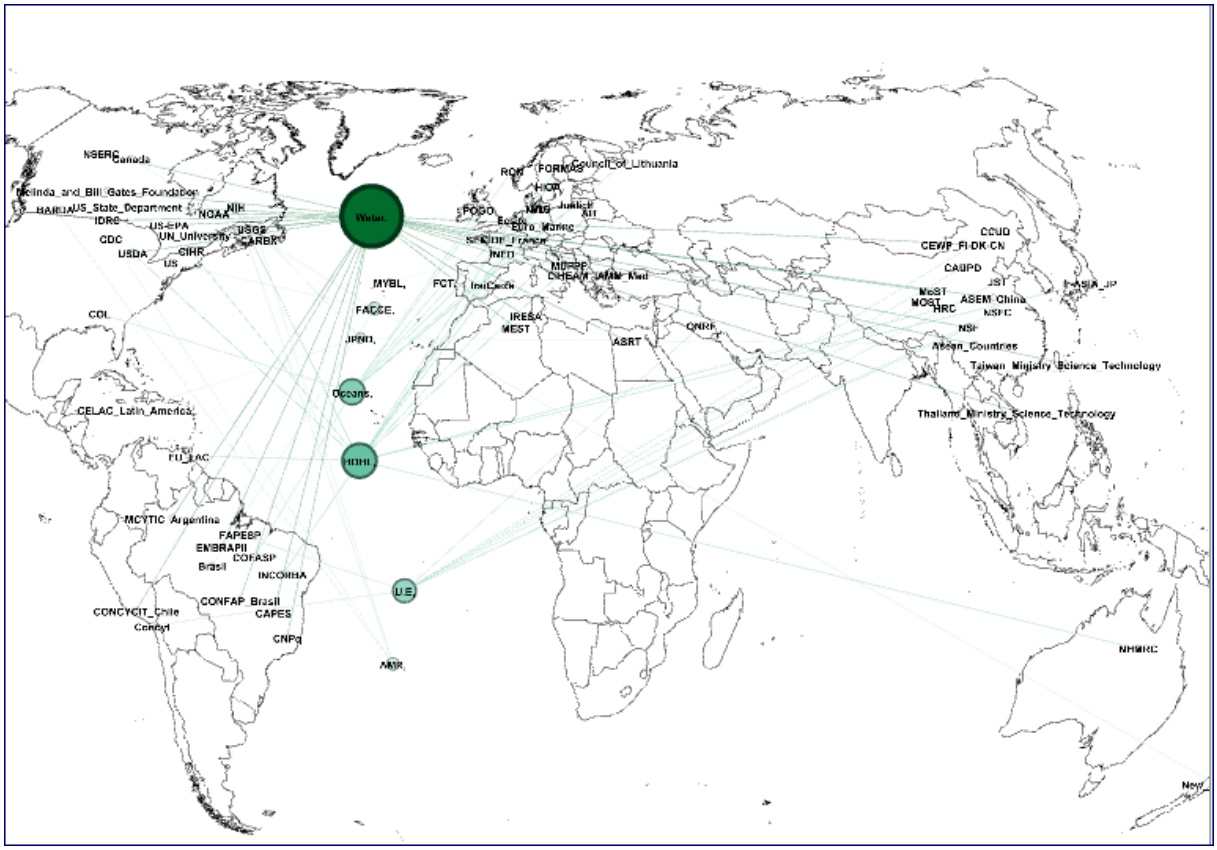


Note: Red dashed lines: potential collaboration; Blue dashed line: exploratory phase; Green lines: effective collaborations
Nature of the collaborations: Membership; Regular meetings; interaction with the advisory board; joint workshops; strategic and operational exchange; identification of research gaps; cooperation in projects;

Engaging policy makers and developing policy links at the European and global levels are highly important aspects of addressing societal challenges and for the success of Joint Programming. Policy collaborations may translate into policy briefs, position papers, workshops, as well as actual changes of policy at national, European or international level.

As displayed in Figure 5.2.6., JPIs AMR and Oceans emerge as the most relevant policy collaborators. OECD, G7/G20 and FAO (the UN Food and Agriculture Organization) are each connected to several JPIs. A few collaborations involving Oceans and JPND are not yet effective, such as the potential collaborations with Future Earth and Europe Brain Council.

Figure 5.2.7.Interactions with regional organisations

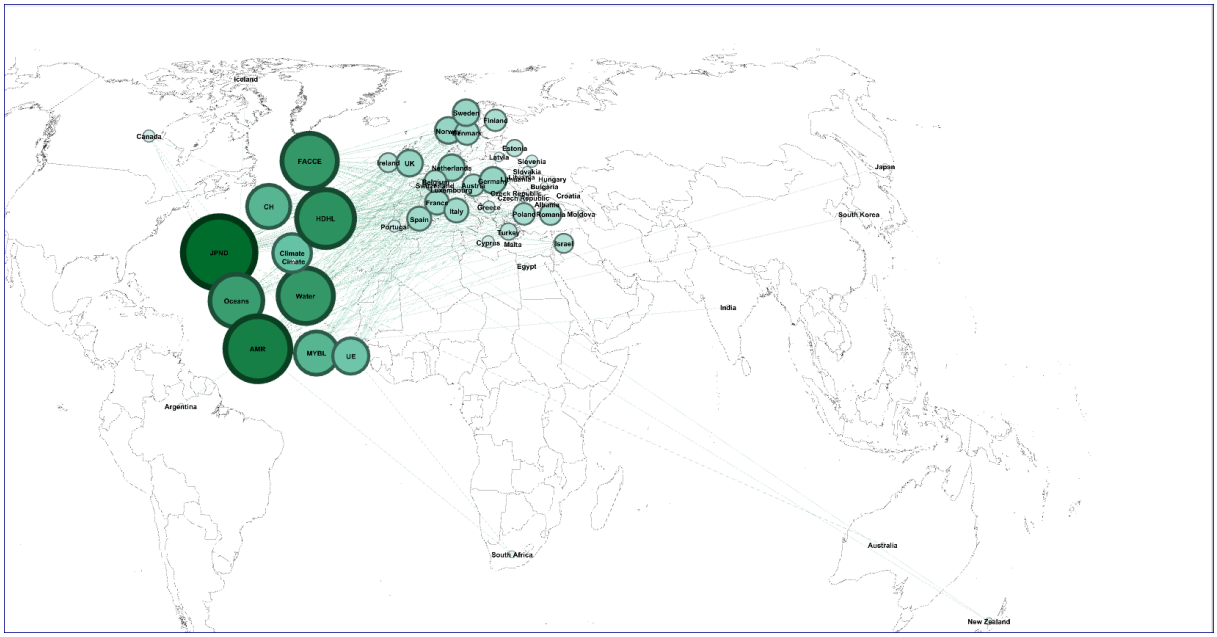


(see Figure 5.2.7B and 5.2.7.C. in Annex 3, chapter 7.3.2, for zoomed-in versions.)

The JPIs were all initiated in Europe and are to a high degree comprised by EU MS and AC (Figure 5.2.8). Nevertheless, Australia (JPND, HDHL) New Zealand (HDHL and FACCE), South Korea, Japan and India (AMR), and South Africa (Water and AMR) are already participant countries, denoting a trend of widening. JPND stands out as the JPI engaging the largest number of countries (member countries, AC and observers), followed by FACCE, HDHL, Water and AMR.

In turn, the central and north countries of Western Europe together with Spain and Italy form the core of countries of the JPIs. However, the Baltic countries and some of the Black Sea countries are also becoming relevant in the European JP landscape.

Figure 5.2.8.-Members Countries, AC and Observers



5.3 Results – The system perspective

The 10 JPIs were categorised into clusters for Food, Health, and Environment. Food Cluster: FACCE, Oceans, HDHL and Climate; Health Cluster: HDHL, JPND, AMR and MYBL; Environment Cluster: Water, FACCE, Climate, Oceans, Urban Europe and Cultural Heritage. Naturally, JPIs display the presence of transnational collaborations, potential and effective, within their thematic area. However, a common pattern can also be observed within the three clusters (Figures 5.3.1, 5.3.2. and 5.3.3):

- there is a considerable number of ERA-NETs —apparently co-existing in the same areas - with which JPIs don´t interact. Collaborations with Articles 185 initiatives seem effective to a few JPIs, but remain a project or in an "exploratory phase" to many JPIs. Together, these findings may raise the question as to what extent do JPIs consistently play their role as broad hubs for the research activities within their areas;

- there are several other instruments created for these thematic areas with little or no connection to JPIs, such as EIT – KICs[8] (aiming at bridging the gap between the research-focused universities and market-oriented companies), EJPs[9] , designed to support coordinated national research and innovation programmes Likewise, there are no significant interactions with public-private partnerships such as ETPs[10], or CPPPs, which are industry-led stakeholder fora recognised by the ECn as key actors in driving innovation, knowledge transfer and European

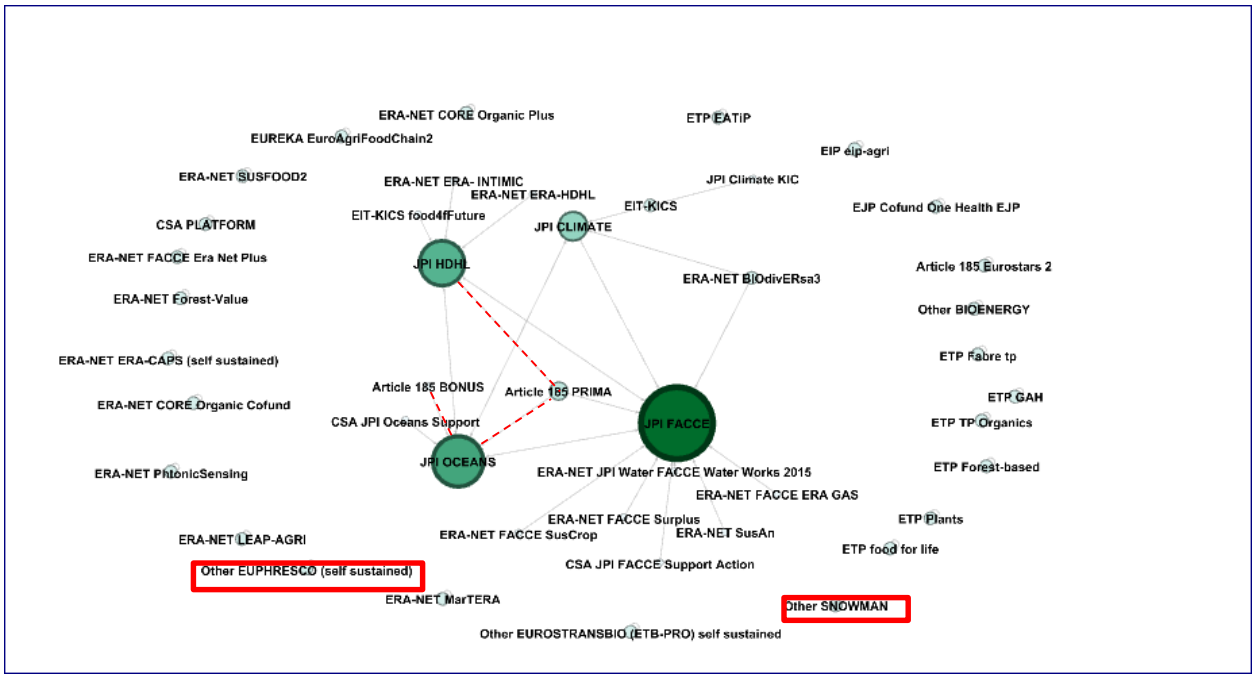
[8] EIPs and EIT KICs (European Institute of Technology Knowledge Innovation Communities) are not public-private partnerships in the same sense as ETPs, cPPPs and JTIs. They facilitate industry-research collaboration, but they are not industry driven. Hence, in this report, they are discussed under P2Ps and other partnerships. Despite their slightly different origin, both ETPs and ETIPs are typically and also in this report identified as ETPs (Technopolis Report).

[9] European Joint Programme () Cofund Actions, a new instrument introduced in H2020, designed to support coordinated national research and innovation programmes and aiming at attracting and pooling a critical mass of national resources on objectives and challenges of Horizon 2020 and at achieving significant economies of scales

[10] European Technology Platforms

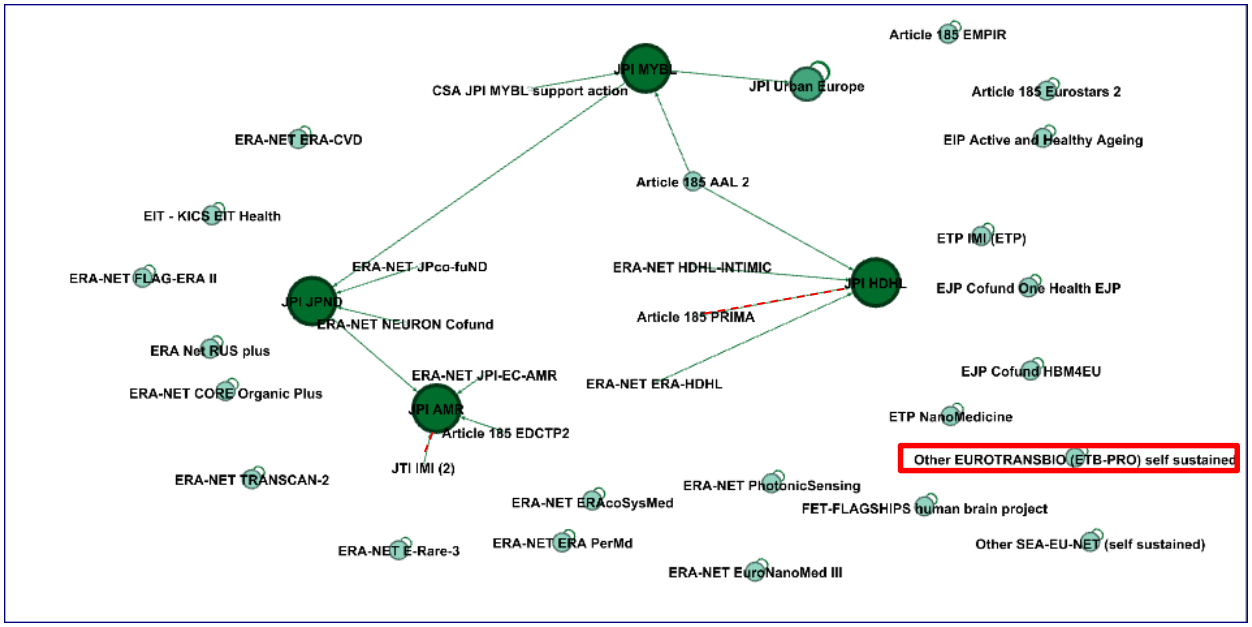
competitiveness. For JPIs to address the full innovation chain, further synergies with these type of instruments would likely be beneficial, as already mentioned in chapter 4.2.

Figure 5.3.1.- Cluster on “Food, Agriculture and Fisheries”



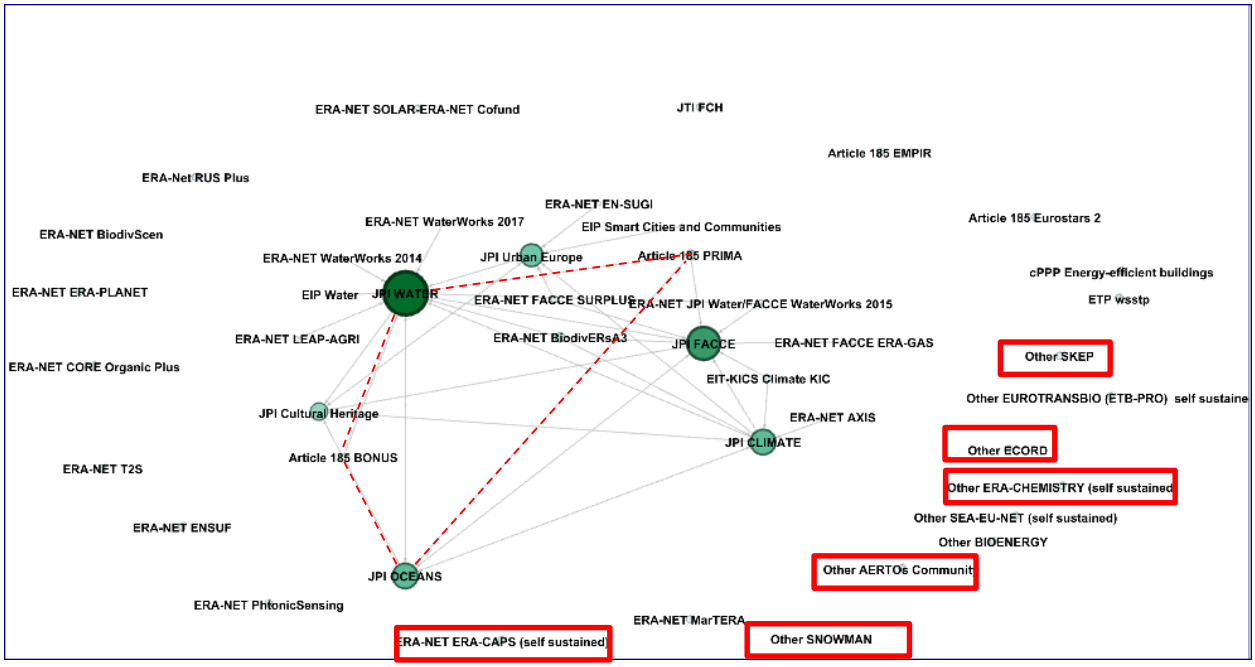
Note: Red rectangle: Past Networking , Red dashed line: potential
Source: ERALEARN

5.3.2 – Cluster on “Health”



Note: Red rectangle: Past Networking; Red dashed lines: Potential
Source: ERALEARN

5.3.3. Cluster on “Environment”



Note: Red rectangle: Past networking; Red dashed lines: potential
Source: ERALEARN

6 Discussion and recommendations

Note: This discussion and these recommendations are not meant to represent official or binding opinions of countries or GPC national delegations.

The analysis of the LTS shows that all 10 JPIs comply in results, outcomes and impact with the overall principles of the Council Conclusion. They have proven to be valuable elements of European R&I, contribute to the development of ERA and contribute to the Framework programme.

The work with the LTS of the 10 JPIs gave a valuable picture of some aspects of the JPP. It reaffirms some of the results from previous analyses of the JPP (e.g. the Hernani report) [11] and allows to suggest some conclusions on how to move on, also in view of national R&D- strategies and the upcoming framework programme Horizon Europe.

The main recommendation coming out of this work is to form a closer dynamical link between all stakeholders and actors under the lead of the Competitiveness Council. This includes prerequisites for sustainability, a proactive role of the EC and a more operative framework for the Joint Programming Process. As a result, JPIs that are well on their way to become major players in their respective domains for JPP and win-win alignment, could achieve much more if they were to get stronger high level political support.

To address the needs for realising this broad, overall statement, 7 detailed recommendations are displayed below with specific arguments:

1- A stronger mid-term (3-5 years) commitment to the JPP by Member States and Associated Countries

Several JPIs indicate that there is a strong member country commitment in the form of MoUs and short term (1-2 years) financing of joint activities and the support structure / secretariat. However, **the long term nature of the JPI challenges calls for long term, or at least mid-term (3-5 years) support to achieve the necessary sustainability** and this has proven to be profoundly difficult to attract. This is a crucial aspect that has been observed also in previous analyses that in addition means that JPIs spend a significant amount of their resources on securing funding (as pointed out e.g. in the Hernani Report). Since JPIs are member country driven, the responsibility for sustainability primarily lies with the JPI member countries, whereof most are represented in the GPC. Hence, it would be a valuable contribution to the JPIs if GPC would make it a priority to engage much stronger, at high political level, in the support of the JPP, and JPIs in this context. GPC delegates could play a key role in organising national coordination and support. It is important to note that some JPIs have come further towards sustainability than others and thus could share good practices (see Chapter 3.3.1). It is central for JPIs to continuously demonstrate their achievements and pivotal role in the Joint Programming landscape to attract increased member country commitment

To this end, the JPP including the JPIs needs to be high on the agenda for member countries to boost synergies between regional, national and European investments to achieve the desired mid-term

[11] European Commission (2016); Evaluation of Joint Programming to Address Grand Societal Challenges Final Report of the Expert Group (Angus Hunter (Rapporteur), Juan Tomas Hernani (Chair), Claire Giry, Kristin Danielsen, Leonidas Antoniou)

sustainability. This would preferably include a stronger collaboration with the JPIs in R&I priority setting for designing national work programmes and calls.

2- Continued mid-term (3-5 years) commitment from the EC Framework Programme for leverage effect on MS/AC

The analysis elucidate the value of JPIs for European research and the ERA in particular, including the EC framework programme. JPIs therefore need to be taken into account for planning and priority setting in the new framework programme Horizon Europe. For example JPIs could have important functions in particular related to:

- the Mission Oriented Approach to mobilize partnerships at regional and national level within a dynamic European framework;
- the development of EU Clusters related to global challenges relevant for 2030 UN Agenda on Sustainability Development Goals.

This would entail mid-term funding commitments for individual actions, typically 3 to 5 years. **As indicated in several of the LTS, even a modest level of EC FP support can make a big difference**, like a CSA funding for coordination. More substantial support, like a suite of targeted cofund calls (as offered by the current European Joint Programming instrument), would in the hands of JPIs be an efficient way to realise a mission oriented approach and to leverage MS engagement.

Thus, a more stable and coherent support by the EC Framework Programme would therefore be a crucial complement to MS efforts and an invaluable improvement for the JPP. This kind of European level support has proven to be the 'glue' or the 'leverage' that brings MS together and motivates other players to step up their efforts.

3- More involvement of stakeholders and industry

The JPI LTS all show some involvement of stakeholders, be it in their advisory boards or even to a minor extent in implementation of their SRAs or SRIAs. **With their task of tackling societal challenges, JPIs should in general consider involving multiple stakeholder categories to a greater extent in their core activities** (i.e. not just in stakeholder advisory boards), concerning among other things legal and ethical issues and early adoption of novel knowledge. The importance of stakeholder involvement can be expected to increase as JPIs develop towards implementation and actual societal impact.

This includes the involvement of industry to a significantly greater extent than now. According to the LTS all JPIs are possibly relevant to industry.

The LTS also show that many of the JPIs are well aware of the necessity of a greater involvement of stakeholders and industry and that they are actively working on it. It is also evident that this is not always an easy task. This process could be facilitated by involving national innovation support agencies and ministries of enterprise and innovation to a greater extent.

4- A better alignment between JPP and Horizon Europe

The LTS indicate that most of the JPIs are collaborating with the EC units in their domains and to some extent are involved at a case-by-case basis in the priority setting part of the FP. On the other hand the JPP is a MS process focusing on the coordination of national programs and priorities and there is normally no direct coordination between calls from the Framework Program and JPI agendas and activities.

An analysis of the EC's proposal for Horizon Europe shows that the topics of all JPIs are priorities to be dealt with in this future Framework Programme for European research.

In Horizon Europe, the experience and expertise of JPIs should be viewed as an asset in their respective domains and their challenge-specific experience (especially their work with SRAs and SRIAs) should be utilized in priority setting processes. Naturally, it is important that the JPIs themselves initiate interactions with relevant actors to impact the specification of Horizon Europe.

5- Strengthened positioning of the JPIs and the other JPP initiatives within the European research landscape and beyond

The Analysis of the LTS showed that all JPIs are already cooperating with other organisations in their fields. The LTS also display substantial international cooperation already and it appears that JPIs are particularly strong in that regard. These collaborations should be further intensified in order to contribute to a defragmentation of R&D in Europe and beyond, including both PPP and P2P.

The analysis also shows that in transnational terms, there is room for improving the level of collaborations with other initiatives in the field. **For JPIs to truly become leaders within their domain, they should consider to interconnect with a broader diversity of initiatives. This task is at the core of joint programming and is important for setting the agenda on national, European and international levels and addressing the full innovation cycle.**

The LTS bare witness of a multitude of ongoing collaborations, such as engaging in joint actions (as through calls, research activities and MoUs), in knowledge dissemination (workshops, conferences), in capacity building (infra- structure sharing, scientific knowledge sharing, data sharing), in strategic advice (discussing SRIA and broader agendas, collaborating with advisory boards, regular exchanges while implementing EU policies), and in policy discussions at a political level.). These achievements should be stressed and further developed, not the least since in some cases these collaboration seem to still be in an exploratory phase.

Currently the ERAC-Ad-Hoc Working group on Partnership Initiatives[12] is elaborating a criteria framework for Partnership initiatives in Europe, aiming at a more coherent, more effective, less fragmented landscape with an increased accessibility and enhanced transparency and at an overall rationalisation of the funding landscape. This criteria framework will be proposed to the EC and to the Council. Following to the work of the ERAC-Ad-Hoc Working group on Partnership Initiatives, the EC will propose a framework for the future set up of partnership initiatives requiring the Community support as a follow-up of the current P2P, PPPs and CSAs. It will be highly relevant for JPIs to comply with this framework if they require future funding from the Framework Programme. The 10 LTS will no doubt have contributed to the image of JPIs that hopefully is one of well recognised partnerships that the Working group and the EC find it natural to take into account when formulating this framework. GPC could support the JPIs in their efforts to adapt to this criteria framework developed by ERAC.

6- Periodical JPI updates

As already mentioned, these LTS constitute valuable strategic documents on the positioning of the JPIs within their respective R&I domains and can be used, among other uses, in discussions on priority setting and programming at national and EU-levels. Therefore ideally the LTS could become living

[12] ERAC Ad-hoc Working Group on Partnerships, Chair: Maria Reinfeldt. participating countries: AT, BE, HR, DK, EE, FR, DE, GR, HU, IT, LUX, ME, NO, PL, PT, SI, ES, SE, CH, UK ; Final report to ERAC Mid-November 2018 in view of adoption at ERAC Plenary Dec. 14, 2018

documents with regular updates to take into account new developments, e.g. every two years. To begin with, the JPIs that have only submitted a draft LTS could send final versions.

It has been pointed out that the part of the LTS that would benefit from updates is not the actual long term strategy description, which is expected to stay more or less constant for the periods in question, but the accompanying description of accomplishments, ongoing activities and short to mid-term strategies (i.e. up to around 5 years). Hence, the reporting format should be discussed by the GPC and JPIs and it may be preferable for JPIs to provide periodical progress reports rather than updated LTS. If a format for periodical updates is agreed upon, the 10 JPIs could be invited to deliver their first update by June 2019. This would allow the JPIs to take into account the proposal for the next framework programme (Horizon Europe) and the recommendations by GPC elaborated in its report on the JPI LTS. This reporting activity should be viewed as a valuable opportunity for JPIs to exhibit their activities towards the next decade challenges rather than to be considered as an unnecessary burden.

As a next step, **GPC in collaboration with the 10 JPIs could define a long term plan for updates and agree on a structure for the future process.** The EC should be invited as an observer to allow for a better coordination with strategic programing processes in the FP.

The LTS analysis points to a several opportunities for JPIs to broaden and clarify their message in any update documentation. Further systematised information on issues like the achieved impact of partial solutions to the challenge, the additional global expertise needed and its distribution pattern across countries and sectors, the nature and depth of stakeholder involvement and how the remaining challenge still affects important public and industrial agendas and third countries would strengthen the strategic character of the reporting and contribute to projecting a more dynamic picture. Such an expansion of scope would support and highlight the efforts of JPIs to move beyond basic research activities to involve the whole innovation chain in order to deliver increasingly mature impact.

7- A stronger and more active JPP-supporting mechanism

The ERA-related group dedicated to the coordination of national research programmes and policies, and thus for Joint Programming is recommended to play a stronger and more active role, in particular by:

- ensuring a strong and stable MS commitment to the JPP including securing support for the JPIs
- establishing national processes to back the JPP at national levels in the EU MS and AC
- supporting the JPIs in their efforts to coordinate the national R&I within their domains
- being the key actor supporting the JPIs in implementing their SRAs and SRIAs
- ensuring a properly structured relationship between the actors involved in Joint Programming and supporting regular exchange
- supporting and surveying the implementation of the recommendations of this report
- improving/developing a monitoring framework for JP instruments in order to better address the JPP and the required strategic coordination, including a review of the IG3 criteria.

To be able to achieve this, **the responsible group would need a stronger representation by Member States and Associated Countries**, as well as more resources from MS and the EC[13], than what is now the case for GPC.

Furthermore, **this group needs to be more operational than the current GPC**. Towards this end, the group could learn from good practices and alignment processes between MS/AC/EC developed by other ERAC Groups, especially the European Strategy Forum on Research Infrastructures (ESFRI). This group has developed efficient Working Groups covering the different domains, as well as implementation and funding issues.

[13] The role of GPC has been discussed previously, resulting in the documents adopted by GPC: ERAC-GPC 1305/15, "Keeping the GPC up to the Job" and the work of GPC IG1 ERAC-GPC 1303/16 "Fostering and mentoring JPIs"

7 ANNEX

7.1 Annex 1, the IG3 Criteria Approach

The IG3 criteria allow assessing the Topic of a JPI, the Engagement of the actors involved, the Governance and the Results along the relevant dimensions and facets. As an example: It can be assessed if a Topic in still relevant (dimension value added, facet relevance). The diagrams 4.3.1., 4.3.2 and 4.3.3. in chapter 4 illustrates the IG3 criteria. The respective criteria and facets are described by leading questions that allow "yes" (criterion fulfilled) or "no" replies.

The criteria developed by GPC IG3 on the assessment of JPIs formed a major basis for assessing the LTS of the JPIs and enabled to discover strengths and weaknesses across the initiatives with their multitude of activities.

An iteration on the preliminary grades proposed by the TF took place from mid-March to mid-May with each JPI Chairs and/or Secretariat, to remove possible misinterpretation of LTS documents. This process consisted of a mutual learning exercise, in the sense that there was weak guidance on the criteria produced by the GPC IG3 Working Group. The broad scope of each criterion allowed for no unique answer, while different approaches had to converge to a clear picture on the subject. This degree of diversity and the spread of information along the LTS, made this exercise particularly demanding and time consuming, for both TF and JPIs, to insure overall quality and coherence.

7.1.1 Methodological description and concerns

The analysis was conducted towards evaluating both available information on and compliance with the criteria. In fact IG3 criteria were designed first as a quality control tool on information only[14]. Thereby, analysing compliance consisted of a further step, and should be understood cautiously, as already mentioned, not necessarily as a grading on the *performance.* That would require a much deeper specific expertise on the science and innovation European instruments, on the scientific thematic landscape and a full knowledge of each JPI's set of activities – thus not only relying on these reports, as excellent as they are.

In this exercise, compliance should rather address the *perception* of the reader on the bases of the relevant information available (in the report), concerning the activities of the JPI on each criterion – *regardless* of any other information. In other words, this compliance should be understood as a second quality control on the information, getting into its content. The meta question on compliance is therefore:

[14] According to the IG3 Report "Monitoring and Evaluating JPIs, page 37:
"The meta-question addresses the quality control element: "do you consider that the information provided by the JPI sufficiently addresses the criterion in question for decision makers/domestic experts to form a well founded and substantiated opinion ?". For each and every criterion, each GPC delegation has to assess whether the information is made available (at hand and possibly added during GPC discussions) and if it sufficiently addresses the description/definition of the criterion and marks it with 'yes' or 'no'. The content itself is not assessed yet, only the fact if there is enough content for a thorough future assessment."

Is there a conviction, on the basis of the available information, that there is a compliance with the questions that describe the criteria?

As compliance is addressing the content of the information, some (mere formal) adjustments on the questions that describe the criteria had to be held, in order to allow for a Y/N answer

Last, unavoidable subjectivity is present in all evaluation exercises, and probably strained when conducted by 5 analysts for 10 JPIs, recalling the need for calibration methods. Nevertheless, this subjectivity to a certain point mimics the real exercise, when this tool is being used by the 30 member countries for each JPI, while scrutinizing the new proposals or the existent JPIs.

In order to produce an analysis in a macro/global way and to be able to identify general patterns, we developed an approach on the bases of the Y[es]/N[o] grades, summing up the number of Y(es) grades by criterion throughout all JPIs, positioning the criterion in a scale of 10 (the set of the 10 JPIs).

We assumed that whenever the grade is N for information, it will necessarily be accounted as N for compliance – since our focus is the report itself, not taking into consideration other possible available sources of information.

To properly address compliance as a dependent variable on information, the amount of Y[es] on compliance was normalized, i.e, transformed as a % of the total Y[es] on information for each criterion. By this token, comparability among the different situations occurring in patterns with the same amount of Y(es) on compliance out of different amounts of Y(es) on information was assured. Example: 6 Y(es) for compliance out of 10 Y(es) for Information represents 60%, whereas 6 Y(es) for compliance out of 6 Y(es) (of 10 possible) for information represents 100%. The data on information (0-10) is expressed as %.

Likewise, we also approached commonalities and diversity between JPIs reports, by comparing the total sum of Y(es) grades by criterion in two preselected groups, 1) the 4 LTS with the highest number of Y(es) for compliance and 2) the 4 LTS with the lowest number of Y(es) for compliance, to the average number of Y(es) grades in the total set of 10 (see box below and Figures 4.3.1., 4.3.2 and 4.3.3, Chapter 4).

The preselected groups were ranked by the amount of N, *regardless of the content of each criterion* –as their value is equally important for a relevant and sustainable performance of the JPIs. For a normalized comparison between the pattern of the total set and of the preselected groups, Y(es) grade sum up values were also transformed into percentages, in order to avoid scale effects. In this case analysis is purely on relative terms (the highest grade = 100, either for the set of 10 and for each sub group, corresponds to 100% of Y), allowing comparison in terms of pattern.

In a nutshell, transformations on the gathered information to be accounted for were:

I- for all JPIs:

a) *<u>Information</u>: the total sum of Y(es) grades by criterion on information/Total number JPIs, by criterion (=10);*
b) *<u>Compliance:</u> the total sum of Y(es) grades on compliance by criterion)/ the total sum of Y(es) grades by criterion on information*

II- for pre-selected groups of JPIs (a particular case of I):

c) *information): the total sum of Y(es grades) on information by criterion in two preselected groups – the 4 LTS with the most and the 4 with the least Y(es) for compliance / Total number of LTS, by criterion (=4);*

d) *compliance: the total sum of Y(es grades) on compliance by criterion in a two preselected groups – the 4 LTS with the most and the 4 with the least Y(es) for compliance / Total sum of Y(es) grades on information of the pre-selected LTS (4more; 4less) (Figure 4.3.2 and 4.3,3)*

Bearing in mind that all these criteria were considered crucial for JPIs monitoring and evaluating, and JPIs could not fail any of the Miminum Criteria (MCs), we assumed while analysing them the following layers:

- optimal –= 100%,
- highly satisfactory - ≥80%and ≤100%,
- and still not satisfactory/sub-optimal ≤ 70%

7.1.2 Some fundamentals on the IG3 approach:

According to the IG3 Criteria the main axes are on *Topic*, *Engagement*, *Governance*, and *Results, Outcomes and Impacts*. They comprehend more operational or intermediate issues that allow for sustainability and implementation of activities under the JPI - as *Engagement* and *Governance* - and more upstream or final concerns, closer to the core targets of this European instrument – tackling societal challenges - as *Topic* and *Results*. The scope of these axes are defined by the IG3 Report as follows (pages 40 to 41).

"The Topic is the real touchstone of the Joint Programming - all the activities and commitment converging to its approach, solution or upgrading - and its relevance and resilience overtime have to be monitored and consensually accepted. Features such as the degree of internationalisation, implicit industrial challenges and pre alignment on the topic are also important dimensions.

The Engagement stands for the indispensable critical mass when tackling global challenges, considering its large spectrum. The degree of commitment and the "embodiment" of common efforts by the participating countries (either in funding terms or in other forms of resources sharing), and the expressed interest of a balanced and increasing number of participating countries – and their sustainability in the long run – are attributes of *The Engagement.* Track record and the quality of actors account for an accumulated joint experience and a desirable complementarity of profiles and assets.

The Governance is based upon the organisation capacity of the JPI's structures, beyond the participants themselves, to reach its goals on efficient terms. It entails the capacity of leadership, to build or redress a vision, to create or update SRAs/SRIAs, the capacity to involve relevant stakeholders in the whole cycle of joint programming, namely industry and civil society stakeholders, and, in some sense, also alignment, allowing for complementarity between bottom-up and top-down decision making. Broader participation of the quadruple helix stakeholders in the governance process and transparent and sustainable managerial structures will build on faster dissemination of knowledge and stimulate more innovation-led solutions, bridging existing gaps.

The *Results, Outcomes and Impacts* seem to close the cycle up to *the Topic* (while the two other axes are more "intermediate" or functional in their substance, or more structure and process led, to use the terminology of the ERA LEARN 2020 Report). Evaluating the impacts, whether at national, international or transnational levels is, even if rather complex, an utmost important condition for effectiveness and efficiency of policy making. Two main levels of impacts are comprehended in this axis: impacts on societal challenges (Topics), the ultimate purpose and *raison d´être* of JPIs, and impacts on R&D&I systems as a whole, including the excellence (not only scientifically), improved internationalisation as a

very important driver of the systems scale, and de-fragmentation. Impacts may translate into effective support to policy making, into new technological paradigms and induce structural improvements in collective behaviour. Strong leadership will be an enabling condition and an outcome in terms of setting the international agenda and pushing JPIs as real world-class leaders."

The IG3 report included a section – "Additional reflections on the criteria regarding *Results, Outcomes and Impacts*, which addressed the following concern:

"Given the very diverse landscape of JPIs showing different stages of maturity, hindering their levels of impacts, on one side; and given the diverse nature of the expected impacts themselves, demanding differentiated levels of time and maturity, on the other, the IG3 considered a breakdown in short, medium and long term impacts and outcomes in the scope of the conceptual framework of criteria" (page 46).

Nevertheless, further improvement and maturation on this particular issue - a breakdown in short, medium and long term impacts and outcomes - would be required, being quite advisable a gradual/incremental implementation of this conceptual framework in the meantime. To overcome this shortcoming, the TF was particularly flexible on these criteria, accepting early signs of impacts (as, for instances publications, patents, other) as an adequate answer.

7.1.3 Improvement opportunities for the IG3 criteria approach

This chapter compiles the inputs collected from the JPIs following the evaluation exercise for each block of criteria along the four axis (7.1.3.1 through 7.1.3.4). As the evaluation has been used to assess the LTS, JPIs naturally do not distinguish between general evaluation framework issues and specific application to the LTS assessment.

This compilation, though, has the value of helping judge the applicability of the methodology to also specific aspects of the JPI activity.

At the end of this compilation, paragraph 7.1.3.5 presents the Task Force conclusions from the JPI input. There, a clear distinction between general IG3 issues linked to the analysis of the LTS are clearly separated from those referring to the IG3 general framework. As previously stated, some of these issues stem from the TF method and from the introduction of the compliance approach – not considered in the IG3 quality control mechanism.

Specific comments on blocks (axes) and individual questions:

7.1.3.1 Axis Topic

In general, the set of questions may provide for a good profile of the underlying subject, which is the relevance of the topic. However, some questions were considered "unfair" for this LTS analysis as they were not mentioned in the LTS template. Other questions are actually not formulated as yes-or-no questions. In particular, the "Compliance" meta question is difficult to assess in many of them for the reasons indicated above.

MC1 Value added Relevance Is the challenge tackled still global and relevant to the EU (and in which way)?

The question is appropriate. It allows to assess the relevance of the initiative.

MC1.1 Value added Relevance And in which way?

It could be considered redundant with the detail required in the question above in and with the following question MC2.

MC2 Value added Relevance Why is a JPI still the most appropriate way?

The question should be subsumed in the previous one. It is also a bit unfair in this LTS context to have this question as a "Minimal condition", since there is no specific question in the LTS addressing the value of the instrument itself.

C1.1 Value added Societal benefits What will the (additional) solution to the remaining challenge change in the EU?

Confusing wording for a question that seems to address the very objective of the JPI. It does not help the reference to "additional", that has not been introduced before. Besides, it does not admit a Y/N answer, at least for the Compliance Meta Question.

Alternative: Will the remaining implementation of the solution bring changes to the EU in the direction of its intended objective? (And in which way?)

C1.2 Value added Internationalisation Is the (remaining part of the) challenge still important to the international R&D&I landscape and cooperation (and how) ?

In practice, this is part of the previous question. Appropriate.

C1.2.1 Value added Internationalisation And how?

Question already included in the previous one.

C1.3 Focus Internationalisation Is new global expertise needed (if so located where?) to tackle the (remaining part of the) challenge

Appropriate question

C1.3.1 Focus Internationalisation If so located where?

Appropriate question. It does not admit Y/N for the "Compliance" meta question.

MC3 Focus R&D&I (How) does the (remaining part of the) challenge affect important public and industrial agendas and/or initiatives

A twisted wording to convert a qualified answer into a Y/N.

MC3.1 Focus R&D&I and industrial agendas and/or initiative

See above.

C1.4 Focus Resilience Describe new potential alternative "solutions" to the (remaining part of the) challenge

There is no specific section on this aspect in the LTS. Some LTS, nevertheless, may address indirectly this question.

C1.5 Coverage Inclusiveness Is the (remaining part of the) challenge able to interest additional MS/AC or third countries?

Appropriate

C1.5.1 Coverage Inclusiveness Or third countries?

It could be considered redundant with previous formulation

7.1.3.2 Axis Engagement for existing JPIs

In general, the questions are difficult to respond, even with the LTS providing some material. Evidence is intrinsically difficult to be probed, proved and reproduced. Questions are ambiguous or inadequate in many cases. The reason can be found in the intrinsic difficulty to assess concepts like "commitments", particularly for an instrument which main characteristic is the voluntary contribution to its functioning.

MC4 Critical mass Number of countries Are still at least 15 countries continuing to participate (excluding observers) in the JPI ?

Why 15? Is there a minimum number of countries established for JPIs to be relevant?

It could be formulated differently, leaving more margin for assessment on the basis of the actual objective of the JPI, e.g. "Participating countries contribute collectively the critical mass of resources to achieve the objectives?".

MC.4.1 Critical mass Number of countries Are new countries committing to participate?

The question is relevant. More relevant would be whether the applicant countries would contribute significantly or not to the JPI objectives

MC5 Critical mass Quality of actors Are the most relevant actors continuing to participate (representing the quadruple helix insofar as relevant) ?

This question needs further explications on order to avoid ambiguities: Are "actors" the Agencies or the entities participating in the Jas and JFAs? What does it mean "participate". A possible alternative would be: "Is the JPI involving in its activities relevant actors from the quadruple helix?

MC6 Critical mass Commitment What specific support will the participating countries continue to provide to the JPI (qualitatively and quantitatively)?

This question is highly speculative, particularly in the "compliance" meta question. Nevertheless, it is possibly unavoidable and necessary. The question should be put starting by "Is there evidence that…participating countries will continue to provide…"?

C2.1 Critical mass Resources Did the participating countries provide/mobilise the support as initially promised to the JPI (qualitatively and quantitatively; in absolute and relative numbers)?

Not all LTS provide that level of detail, particularly in retroactive terms, needed to assess whether the "initial" commitments have been maintained. Without this qualification, the answer may only be partially meaningful.

C2.2 Critical mass Resources Which resources were acquired from other sources (third countries, EU-funding, …)

It is considered relevant to have information about the origin of the resources.

MC7 Critical mass Sustainability Is the commitment sustainable (effective and sufficient) in the long run?

It is a relevant question but it should be more precisely formulated and substantiated with something more than the general information that the LTS may reasonably provide.

C2.3 Robustness Track record Are the participating actors at the forefront of research worldwide, in Europe, in their country?

It is not clear if the question referring to the Agencies participating or to the R&I related entities attracted. It is presumably the latter, but the question should be better formulated.

C2.4 Robustness Quality of actors Are participating actors interchangeable or completely complementary? How is the required knowledge and expertise distributed over the participating actors and countries?

It is not clear what this actually brings to the assessment. It seems to assume that knowledge is distributed according to same pre-established plan or pattern, but this is strongly dependent on the topic or specific call.

C2.4.1 Robustness Quality of actors How is the required knowledge and expertise distributed over the participating actors and countries?

Sub-question of the previous one. See above.

C2.5 Coverage Inclusiveness How are the (type of) participating actors distributed across Europe ?

Similar comment as for C.2.4 above.

7.1.3.3 Axis Governance for existing JPIs

This axis puts the focus on distribution of responsibilities and leadership. In some cases, it does not fit well with the LTS of the JPI.

C3.1. Value added Alignment Have mechanisms for fostering alignment been functioning appropriately ?

Appropriate question

C3.2 Focus Leadership Is the lead partner overall well recognised and respected?

In our view, JPIs are not consortia of entities with a leader, but National Agencies contributing to common goals.

C3.3 Maturity Leadership Has the distribution of roles and responsibilities (R&D&I) been functioning appropriately?

It would be recommendable to reformulate the question, proposal would be: “Is there a operational governance in place?”

MC8 Maturity Strategic vision Have effective SR(I)As been built ?

The question is relevant, but, in part, the answer to the question depends on the degree of fulfilment of the actions foreseen and the outputs, outcomes and impacts actually achieved. An a priori excellent SRIA which has not been delivering has therefore been poorly defined.

MC9 Maturity Commitment Have the GPC voluntary guidelines and Framework Conditions been adopted in practice?

The question is relevant, but most of the LTS have not addressed this question explicitly (In fact, nobody expected the LTS to be studied systematically)

MC10 Robustness Sustainability Is there a clear, well-functioning managerial structure that is organised in a sustainable manner?

Very appropriate. This question should override questions C3.2 and C3.3. above.

MC11 Robustness Openness Have stakeholders effectively been involved in knowledge circulation and decision making?

Appropriate question

C3.4 Robustness Strategic vision Have contingency plans been needed and/or adapted?

Appropriate question

7.1.3.4 Axis Results, Outcomes, Impacts (including time span) for existing JPIs

In general, the questions help provide sufficient insights on the fulfilment of this criterion. However, many of its components are considered Minimal Conditions. Yet, both the questions and the possible answers are, by definition, gradual and difficult to reduce to a Y/N answer.

MC12 Value Added Societal benefits Which kind of specific (partial) results or contributions (in terms of R&D, policy advice, …) the JPI has delivered to (various) target or stakeholder groups related to the overall challenge compared to the original plans ?

Appropriate. Nevertheless, it has not a Y/N possible answer, particularly for the "compliance" Meta question. Which threshold is to be set in order to assess a go/no go qualification of this criterion?

C4.1 Value Added R&D&I Which are the (systemic) effects the JPI has achieved in specific (which?) areas or R&D&I domains of the participating countries?

Appropriate. However, it has not a Y/N possible answer, particularly for the "compliance" Meta question.

MC13 Maturity Leadership Has the JPI become a leader (and in which domains and/or sectors) in delivering research results, technology and/or agenda setting on the national, European and/or global levels?

Appropriate. Nevertheless, providing evidence on this point is hard. Which threshold is to be set in order to assess a go/no go qualification of this criterion?

MC14 Efficiency Knowledge transfer Was the JPI able, in any sense, to effectively induce behavioural change, technology absorption, … by means of adequate knowledge transfer strategies ?

Appropriate. Nevertheless, this is an impact (a long-term, systemic effect) that requires a sufficient time span to happen and a clear methodology to link back effect with cause. Which threshold is to be set in order to assess a go/no go qualification of this criterion?

MC15 Efficiency Fragmentation Which are the potential "gains" (e.g., economies of scale, better thematic coverage, …) that the participating countries have achieved (in terms of pooled funding, efforts, …) – if possible with counterfactual data ?

The question is not very clear since "potential" does not possibly match with "actual" in the same sentence. Either the question refers to measurable effects or to potentialities to be achieved in a reasonable time frame. Nevertheless, it has not a Y/N possible answer, particularly for the "compliance" Meta question.

C4.2 Structuring Effect Internationalisation Which (type of) international cooperation has been induced by the JPI?

Appropriate question. Nevertheless, it has not a Y/N possible answer, particularly for the "compliance" Meta question.

C4.3 Structuring Effect Alignment Which forms for alignment (on the various levels) have been achieved by the participating actors?

This question deserves a more detailed explicit structure. Its formulation, however, is sufficient, but the different levels of alignment could at least be suggested: policy, programming, instruments; European, National…. Nevertheless, it has not a Y/N possible answer, particularly for the "compliance" Meta question.

7.1.3.5 Task Force Conclusions from the JPI input

General comments on the IG3 criteria framework

Important to be familiar with the methodology: An assessor who faces the table of questions, needs to be familiar with the underlying methodology, without which, questions by themselves hold very little contextual value.

The methodology, as described in the document ERAC-GPC 1310/16 *Report of the GPC Implementation Group 3* "*Monitoring and evaluating JPIs"*, requires a deep study and it is everything but simple to grasp.

Yet, this methodology underpins the actual grounds for the formulation of the questions and attributes some important -critical even- value for particular questions, namely the ones corresponding to Minimal Conditions, which fulfillment or not may determine the fate of a given JPI, according to the proposed methodology. If the complexity of the evaluation criteria and components is to be kept, then a more user-friendly presentation of the questions is absolutely needed.

Yes/No approach: The choice of reducing the assessment to Y/N answers is quite understandable in order to collapse a complex evaluation into quantified values. At the same time, formulation of questions need to be twisted in many cases to adapt to these two options. It is clear that, in many occasions, a degree of grey is needed. A possible approach to overcome this hurdle could be the use of a threshold of achievement that defines either option (e.g. above 80% of accomplishment, Y, else N).

Axis "**Engagement for existing JPIs":** The set of questions aim at assessing the level of compromise of the participating States in in a JPI and most questions properly address this objective However, "engagement" or "commitment" are broad concepts, difficult to assess. Particularly for an instrument which main characteristic is the voluntary contribution to its functioning, "commitment" needs to be framed within this noncompulsory approach. In the absence of legally-binding agreements, past performance needs to be used as a gauge of future behaviour too.

Axis "Governance for existing JPIs": In general, the questions put the focus on distribution of responsibilities and leadership, aspects that may not -and do not in some cases- apply to the way JPIs work. Questions should focus on how efficient and effective governance is and less on the ambiguous concept of "leadership"

LTS-specific comments:

Meta questions: "Meta questions" (Information/content and Compliance) are relevant and important elements of the methodology. Because of its intrinsic importance, some clearer directions on how to

respond is required. While the first column is more straightforward - whether the issue has been addressed, the second is ambiguous, even with the current explanation. The assessor is dubious about whether the question is open to consider external sources of information or context in order to decide whether the JPI is fulfilling the issue or whether the information provided only allows the assessor to make a decision on fulfillment.

A clearer indication of how to interpret the "Meta questions" will help assessors by reducing the uncertainty linked to its interpretation.

Axis "Topic": In general, the set of questions are relevant and well chosen. However, some questions address aspects not explicitly requested in the LTS and some others have a complicated formulation in order to reduce them to Y/N answers. In particular, the "Compliance" meta question is difficult to assess in many of them for the reasons indicated above.

Keep only those questions for which the LTS is expected to provide input. Make clearer formulation of questions.

7.1.4 The process of analysing the JPI LTS

The task Force has analysed the LTS's using the criteria developed by IG3 as a structured conceptual basis upon which to draw conclusions. The work was done in 5 phases:

- Each individual JPI was submitted to an independent scrutiny by 2 different analysts who are members of the Task Force (Phase 1), and a cross-checking process followed (Phase 2 and Phase 3) in order to harmonize results in a consensual way, after discussion on the arguments at stake (Phase 4).
- This analysis was undertaken in terms of either information(/content) and compliance, consisting of a check on the following meta-questions:
    - Is there enough information available to answer the questions that describe each criterion?
    - If there is enough information, is there a conviction on the compliance with the questions that describes the criteria?
- A more complete documentation of the content of each criterion was also conducted to provide the analysts with a clear and harmonized classification of information. This documentation is available in the spreadsheets we are sending (Worksheet "IG3 Criteria additional content").
- In Phase 5 the JPIs were confronted with the results of the analysis and they were given the possibility to comment on them. The final grading was taken by the TF.

After the internal analysis of the LTS were completed the Task Force contacted the individual JPIs and confronted them with the analysis of their JPI's LTS using the IG3 criteria with the purpose of a quality control and to ensure that important aspects from the point of view of the JPIs could be addressed. Purpose of the contact with the JPIs was twofold:

- Crosschecking of the findings of the TF using IG3 criteria
- Mapping collaboration patterns of the JPIs

An inevitable result of this interaction was the identification of multiple instances where the LTS text does not cover a criteria but where more recent developments of the JPI do. This doesn't affect the

grading of this analysis but constitutes an important spin-off effect of this work that we have encouraged the JPIs to capitalize on for future LTS updates.

7.1.5 Approach to the criteria defined by the ERAC ad-hoc WG on Partnerships -Council Conclusions 2017

According to the Mandate of the ERAC Ad-hoc Working Group on Partnerships, "the CC include a list of guiding principles for selecting, implementing, monitoring and phasing out R&I partnerships that should underpin the revised criteria. Based on the discussion from the first WG meeting, tentative definitions and explanations on these guiding principles are presented hereafter. They need to be sufficiently flexible to allow a differentiation for the different types of R&I Partnerships. These guiding principles follow the fundamental principles of the future Framework Programme as outlined in the Council conclusions: *cooperation*, *excellence*, *impact* and *openness"*. Criteria used for JPI (IG3 criteria) both for the assessment of possible new JPIs and existing JPIs are also mentioned in this context as part of the existing general assessment framework.

According to the ERAC Ad-hoc Working Group on Partnerships "Recommendations on the criteria for selecting, implementing, monitoring and phasing out of R&I partnerships" approved in last ERAC Meeting (17 of May), these definitions encompass the following dimensions: *EU Added value*, *Transparency*, *Openness*, *Impact*, *Leverage effect*, *Long term financial commitment of the involved parts*, *Flexibility*, *Coherence* and *Complementarity*.

The ad hoc WG developed a more refined set of definitions, as follows:

> **EU Added Value:** As part of the EU R&I ecosystem, partnerships must facilitate creation and expansion of multinational research and innovation networks that bring together relevant and competent actors from across Europe, thus contributing to the realisation of the European Research Area. Union co-funding/investment in Partnerships will be limited to areas of high European added value and relevance for agreed European political priorities, including the further completion of the ERA and an optimal R&I cooperation in Europe. The EU added value needs in particular to be reflected in the outcome of the strategic programming process for the FP. They should clearly demonstrate delivery of results for the EU and its citizens, notably global challenges and competitiveness, that cannot be achieved by the Framework Programme alone.
>
> **Long-term financial commitment of all the involved parties**: The financial commitment of Participating States and/or industry and other stakeholders is a pre-condition for considering the establishment of a R&I partnership. The commitment should be clear from the outset, and be ensured during the life-cycle of the R&I partnership including beyond Union support, where appropriate. The endured commitment over the life-cycle of the R&I partnership, including adequate human resources, is a core indicator for ensuring the political and/or industrial relevance of the R&I partnership. The potential combination of cash and in-kind contributions require appropriate and transparent calculation methodologies across the different R&I partnership approaches
>
> **Flexibility:** R&I partnerships should demonstrate the flexibility to deploy a wider set of modalities and activities necessary to achieve their objectives, beyond calls for proposals. Flexibility of implementation entails, in addition, the possibility to adapt regularly to changing market and/or policy needs

Transparency: Partnerships should be transparent in the process of identification, selection and monitoring by the EU and MS, but also in the implementation and use of results beyond the partnerships themselves by involving broader stakeholders.

Openness: R&I partnerships should demonstrate a high level of openness in programming and implementation and remove barriers to openness to participation with respect to the priority setting, taking into accounts needs from all MS and AC, participation of new members in the implementation and with respect to international cooperation at programme and project level, towards a broader stakeholder involvement and the openness for dissemination of and access to results.

Impact: Impacts of R&I partnerships should address scientific, innovation/economic, societal and environmental impacts and international visibility. In addition, R&I partnerships should have clear structuring effects and provide visible alignment and directionality of public and/or private R&D investments (qualitative / quantitative leverage). As R&I partnerships might be associated with higher coordination and administrative burden and need usually more time for planning than EU action alone, the anticipated impacts should clearly outweigh these additional efforts.

Leverage effect: The leverage effect of R&I partnerships has a quantitative and a qualitative dimension. The quantitative dimension describes the mobilized national and/or industrial resources that are invested in R&I partnerships and the corresponding leverage effect that the EU co-funding obtained (financial additionality). The quantitative leverage effect needs to be reported on the basis of a harmonised calculation methodology. The qualitative dimension describes issues such as harmonizing programming standards, aligning policy priorities, etc. Especially in the case of PPPs, the 'directionality' of private R&D investments and the associated reduction of R&I related risks can be also seen as part of the qualitative leverage effect.

A correspondence between this definitions and IG3 criteria was thus possible, as follows:

EU Added value → the dimension “value added” in the various axes

Long-term financial commitment of all the involved parties → the dimension “Engagement > Critical Mass”

Transparency → the criterion “Governance > robustness > openness

Openness → the criterion “Engagement > coverage > inclusiveness”

Flexibility → the facet “Resilience” and/or the dimension “Robustness” in the various axes

Impact → the axis “Results”

Leverage effect → the criterion “Results > Efficiency > Fragmentation”

7.2 Annex 2, IG3 Evaluation

7.2.1 Completed IG3 evaluation Tables

The following table (Table 7.2.1) contains the final consolidated grading for all the 10 LTS as a whole for both the Minimal Criteria to comply with (MC1 to MC15) and the complementary criteria (C1.1 to C4.3). This table is structured in 4 blocs covering i) topic, ii) engagement, iii) governance, iv) results, outcomes, impacts; and displayed for each criteria the number of JPI that provide effective information for analysis as well as demonstrate compliance with the given criteria.

*Table 17: axis: **Topic**; for existing JPIs*

MC	dimension	facet	description	All 10 JPIs information Y	All 10 JPIs compliance Y
MC1	Value added	Relevance	***Is the challenge tackled still global and relevant to the EU (and in which way)?***	10	10
MC2	Value added	Relevance	***Why is a JPI still the most appropriate way ?***	9	8
C1.1	Value added	Societal benefits	What will the (additional) solution to the remaining challenge change in the EU?	10	8
C1.2	Value added	Internationalisation	Is the (remaining part of the) challenge still important to the international R&D&I landscape and cooperation (and how) ?	10	10
C1.3	Focus	Internationalisation	Is new global expertise needed (if so located where ?) to tackle the (remaining part of the) challenge	7	6
MC3	Focus	R&D&I	***(How) does the (remaining part of the) challenge affect important public and industrial agendas and/or initiatives***	7	6
C1.4	Focus	Resilience	Describe new potential alternative "solutions" to the (remaining part of the) challenge	7	7
C1.5	Coverage	Inclusiveness	Is the (remaining part of the) challenge able to interest additional MS/AC or third countries ?	10	10

*Table 18: axis: **Engagement**; for existing JPIs*

MC	dimension	facet	description	Y	Y
MC4	Critical mass	Number of countries	***Are still at least 15 countries continuing to participate (excluding observers) in the JPI ?***	10	10
MC5	Critical mass	Quality of actors	***Are the most relevant actors continuing to participate (representing the quadruple helix insofar as relevant) ?***	9	8
MC6	Critical mass	Commitment	***What specific support will the participating countries continue to provide to the JPI (qualitatively and quantitatively) ?***	9	8
C2.1	Critical mass	Resources	Did the participating countries provide/mobilise the support as initially promised to the JPI (qualitatively and quantitatively; in absolute and relative numbers) ?	10	9
C2.2	Critical mass	Resources	Which resources were acquired from other sources (third countries, EU-funding, …)	10	10
MC7	Critical mass	Sustainability	***Is the commitment sustainable (effective and sufficient) in the long run ?***	8	2
C2.3	Robustness	Track record	Are the participating actors at the forefront of research worldwide, in Europe, in their country ?	9	7
C2.4	Robustness	Quality of actors	Are participating actors interchangeable or completely complementary ? how is the required knowledge and expertise distributed over the participating actors and	6	5
C2.5	Coverage	Inclusiveness	How are the (type of) participating actors distributed across Europe ?	7	6

*Table 19: axis: **Governance**; for existing JPIs*

MC	dimension	facet	description	Y	Y
C3.1.	Value added	Alignment	Have mechanisms for fostering alignment been functioning appropriately ?	9	8
C3.2	Focus	Leadership	Is the lead partner overall well recognised and respected ?	8	8
C3.3	Maturity	Leadership	Has the distribution of roles and responsibilities (R&D&I) been functioning appropriately ?	8	7
MC8	Maturity	Strategic vision	***Have effective SR(I)As been built ?***	10	9
MC9	Maturity	Commitment	***Have the GPC voluntary guidelines and Framework Conditions been adopted in practice ?***	8	8
MC10	Robustness	Sustainability	***Is there a clear, well-functioning managerial structure that is organised in a sustainable manner ?***	10	8
MC11	Robustness	Openness	***Have stakeholders effectively been involved in knowledge circulation and decision making ?***	10	8
C3.4	Robustness	Strategic vision	Have contingency plans been needed and/or adapted ?	8	7

*Table 20: axis: **Results, Outcomes, Impacts** (including time span); for existing JPIs*

MC	dimension	facet	description	Y	Y
MC12	Value Added	Societal benefits	***Which kind of specific (partial) results or contributions (in terms of R&D, policy advice, …) the JPI has delivered to (various) target or stakeholder groups related to the overall challenge compared to the original plans ?***	9	8
C4.1	Value Added	R&D&I	Which are the (systemic) effects the JPI has achieved in specific (which ?) areas or R&D&I domains of the participating countries ?	7	7
MC13	Maturity	Leadership	***Has the JPI become a leader (and in which domains and/or sectors) in delivering research results, technology and/or agenda setting on the national, European and/or global levels?***	10	7
MC14	Efficiency	Knowledge transfer	***Was the JPI able, in any sense, to effectively induce behavioural change, technology absorption, … by means of adequate knowledge transfer strategies (in function of the various targets and target groups) ?***	7	6
MC15	Efficiency	Fragmentation	***Which are the potential "gains" (e.g., economies of scale, better thematic coverage, …) that the participating countries have achieved (in terms of pooled funding, efforts, …) – if possible with counterfactual data ?***	9	8
C4.2	Structuring Effect	Internationalisation	Which (type of) international cooperation has been induced by the JPI ?	9	9
C4.3	Structuring Effect	Alignment	Which forms for alignment (on the various levels) have been achieved by the participating actors?	10	10

7.2.2. Additional Information on IG3 content

As previously referred, IG3 criteria were designed as a quality control mechanism. As a quite conceptual mechanism, it is consensual that it needs to go through the reality proof and improvements are certainly needed to make the criteria clear in their content (cf section 7.1.3).

The following tables came out of the interpretation of the criteria themselves in their broad scope/precise meaning independently of the LTS (column additional description), and also the interpretation exercise of the LTS information across all the criteria, picking up specific approaches, gathering them under a certain logic, finding the links to the criteria – and, last but not the least – trying to fill the concepts with concrete examples fitting their content (column LTS arguments). Noteworthy is the fact that the same arguments may fit several criteria, according to their particular angle and context.

This exercise does not pretend to be exhaustive, aiming mostly to setting a common basis for all the analysts of the LTS and consist an embryo to a more systematic improvement.

Acknowledgments are due to Peter Spyns, rapporteur for the IG3, for his availability and support to this systematizing and interpretation work.

*Table 17: axis: **Topic** ; for existing JPIs*

MC	dimension	facet	description	additional descriptin	LTS arguments
MC1	Value added	Relevance	***Is the challenge tackled still global and relevant to the EU (and in which way)?***	importance of the challenge to EU and commiting countries	*Collaboration with the EC and the H2020; Participation in FP9 discussions; Mapping activities,identifying gaps, complementarities and capacities across Europe; Structural funds (policy agenda, preferences, not solely money attribution)*
MC2	Value added	Relevance	***Why is a JPI still the most appropriate way ?***	reasons for a choice of the instrument JPI	
C1.1	Value added	Societal benefits	What will the (additional) solution to the remaining challenge change in the EU?		
C1.2	Value added	Internationalisation	Is the (remaining part of the) challenge still important to the international R&D&I landscape and cooperation (and how) ?	foreseen changes in the challenge stemming from the solution in the EU and for committing countries	*Engaging with international organizations (if they were formally engadged)*
C1.3	Focus	Internationalisation	Is new global expertise needed (if so located where ?) to tackle the (remaining part of the) challenge		
MC3	Focus	R&D&I	***(How) does the (remaining part of the) challenge affect important public and industrial agendas and/or initiatives***	***interest by industry***	*Collaboration with the EC and the H2020; Participation in FP9 discussions; Mapping activities,identifying gaps, complementarities and capacities across Europe; Structural funds (policy agenda, preferences, not solely money attribution)*
C1.4	Focus	Resilience	Describe new potential alternative "solutions" to the (remaining part of the) challenge	alternative solutions	
C1.5	Coverage	Inclusiveness	Is the (remaining part of the) challenge able to interest additional MS/AC or third countries ?	distribution of global expertise/potential regional bias (Northe/South; old/new participating countries	

*Table 18: axis: **Engagement** ; for existing JPIs*

MC	dimension	facet	description	additional description	LTS arguments
MC4	Critical mass	Number of countries	***Are still at least 15 countries continuing to participate (excluding observers) in the JPI ?*** ***Are new countries committing to participate ?***	scale, critical mass: minimum threshold;	
MC5	Critical mass	Quality of actors	***Are the most relevant actors continuing to participate (representing the quadruple helix insofar as relevant) ?***	involvement of public sector, researchers, industry and end users	*Engaging with international organizations (if they were formally engaged);*
MC6	Critical mass	Commitment	***What specific support will the participating countries continue to provide to the JPI (qualitatively and quantitatively) ?***	specific funding support (effective/targetted). Qualitatively: mobility of human resources, sharing of infrastructures, open access, etc	
C2.1	Critical mass	Resources	Did the participating countries provide/mobilise the support as initially promised to the JPI (qualitatively and quantitatively; in absolute and relative numbers) ?	effective current support - in terms of the resources pooled into R&D&I and not governance sustainability (secretariat problems, and so on) → MC10	*Calls (if expression on the countries contribution) ; Structural funds;*
C2.2	Critical mass	Resources	Which resources were acquired from other sources (third countries, EU-funding, …)		*Collaboration with the EC and the H2020 (increase leverage effects and commitment)*
MC7	Critical mass	Sustainability	***Is the commitment sustainable (effective and sufficient) in the long run ?***	stable and guaranteed commitment in the long run in terms of the resources pooled into R&D&I. "future" sustainability	
C2.3	Robustness	Track record	Are the participating actors at the forefront of research worldwide, in Europe, in their country ?	past experience of the particpants on the theme ; joint past/present other joint relevant initiatives (worldwide)	
C2.4	Robustness	Quality of actors	Are participating actors interchangeable or completely complementary ? how is the required knowledge and expertise distributed over the participating actors and countries ?	required knowledge and expertise among the actors; distribution (bias) between interchangeable/complementary actors	
C2.5	Coverage	Inclusiveness	How are the (type of) participating actors distributed across Europe ?	distribution of actors across Europe	

Table 19: axis: Governance; for existing JPIs

MC	dimension	facet	description	additional description	LTS arguments
C3.1.	Value added	Alignment	Have mechanisms for fostering alignment been functioning appropriately ?	mechanisms to foster alignment	*Calls (if a "machinary" to organise several calls) , MoUs, consortium contracts, tailored agreements ,Innovative strategies for infrastrucures and tools to support international research activity (if a result of the JPI internal mechanisms, and show that the mechanism function appropriately) ; Co-planning actions (if the mechanisms rather than the results or actions), Programme harmonisation (if mechanisms rather than the results or actions) ; Facilitating tools; Strategic platforms ; Mapping activities,identifying gaps, complementarities and capacities across Europe (if mechanisms for..)for alignment; Joint translational grant programmes; Exchange/secondment programme for scientists/policy makers (as the recurrent mechanism in the governance of JPIs); Annual for policy makers; Open acess*
C3.2	Focus	Leadership	Is the lead partner overall well recognised and respected ?	clear objectives and plans on how to achieve them	
C3.3	Maturity	Leadership	Has the distribution of roles and responsibilities (R&D&I) been functioning appropriately ?	appropriate distribution of the various roles of the actors in the consortium; appropriateness of the role (in particular concerning leading roles) fulfilled by every actor;	*R&D outputs (as patents, publications); No relation between researchers and national representatives*
MC8	Maturity	Strategic vision	*Have effective SR(I)As been built ?*	*capacity to build (and redress) a Vision and a SRIA; dedicated implementation structure;*	*Foresight Guidelines; Roadmap workshops; Intervention logic*
MC9	Maturity	Commitment	*Have the GPC voluntary guidelines and Framework Conditions been adopted in practice ?*	compliance to the GPC Voluntary Guidelines	
MC10	Robustness	Sustainability	*Is there a clear, well-functioning managerial structure that is organised in a sustainable manner ?*	clear and consolidated managerial structure -	*Concerns about IPR (if stemming from changes in the legal structure and changes in the consortia); Monitoring and assessment (as a structurally established mechanism); Multi call arrangements (if a controlled and established mechanism) and administrative simplification (if in the form of some continuous quality control mechanism to keep the overhead as low as possible);*
MC11	Robustness	Openness	*Have stakeholders effectively been involved in knowledge circulation and decision making ?*	effective involvement of stakeholders in decision making;	*Engaging with international organizations (if they were formally engadged) ;Engaging with policy makers; Exchange/secondment programme for policy makers (if focus on stakeholders -not cientists, but policy makers)*
C3.4	Robustness	Strategic vision	Have contingency plans been needed and/or adapted ?	contingency plans (creation and implementation)	*Monitoring and assessment (if helping to achieve maturity, if to adjust the strategic planning (and contingency plans)*

Table 20: axis: ***Results, Outcomes, Impacts*** (including time span)*; for existing JPIs*

MC	dimension	facet	description	additional description	LTS arguments
MC12	Value Added	Societal benefits LT	***Which kind of specific (partial) results or contributions (in terms of R&D, policy advice, …) the JPI has delivered to (various) target or stakeholder groups related to the overall challenge compared to the original plans ?***	***impacts on the challenge and contributions (R&D, policy advice) to tackle the overall challenge; .***	*R&D outputs (as patents, publications); Testing innovative approaches and science policy cooperation; Multidisciplinary / interdisciplinary approaches; Segmentation in silos, cross sectoral and cross disciplinary scientific approach; Engaging with international organizations (if they were useful to the societal actors); Engaging with policy makers; Membership of international organisations (IMI..); Portfolio of funded research projects (enabling crossinteraction);Exchange/secondment programme for scientists/policy makers (if focused on the results, benefits to the overall challenge); Annual for policy makers*
C4.1	Value Added	R&D&I MT-LT	Which are the (systemic) effects the JPI has achieved in specific (which ?) areas or R&D&I domains of the participating countries ?	expected/observed impacts in the entire R&D&I system: impacts on national R&I systems; scientific areas that are now – by means of the JP - more in the centre of R&D&I in those systems (but we don´t mean alignment here); new relations between the actors inside the ecosystems, more collaborations between ministries, intensification of the role of industry and end users in the area (but not knowledge transfer, here); Intensification of networking, enlarging the knowledge basis of the systems (but not internationalization here)	*Innovative strategies for infrastrucures and tools to support international research activity (if transnational) ; Mirror groups (if more scientific oriented); Synergies with other instruments (ERA-NETs, JPIs, Belmont Forum others) (R&D&I landscape); Use of technologies in large scale*
MC13	Maturity	Leadership ST-MT	***Has the JPI become a leader (and in which domains and/or sectors) in delivering research results, technology and/or agenda setting on the national, European and/or global levels?***	***capacity to become a world class leader***	*Calls (if delivering cutting edge results); Mirror groups (if more administrative, e.g. France); Data Base Projects (as a form of maturity); Synergies with other instruments (ERA-NETs, JPIs, Belmont Forum others); Long term collaboration between local, regional, national and European policy makers and actors (if setting agenda. more than simply doing it- is showing that a JPI is a leader in these activities)*

Cont.

Table 20: axis: ***Results, Outcomes, Impacts*** (including time span)*; for existing JPIs*

MC	dimension	facet	description	additional description	LTS arguments
MC14	Efficiency	Knowledge transfer MT-LT	***Was the JPI able, in any sense, to effectively induce behavioural change, technology absorption, … by means of adequate knowledge transfer strategies (in function of the various targets and target groups) ?***	***potential in terms of knowledge dissemination and technology transfer;***	*R&D outputs (as patents, publications); Novel strategies for industry-academia collaboration; Roadshows; Modelling tools (if transnational) ; Sharing of infrastructures (if transnational) ; Knowledge hubs on emerging areas (if transnational); Concerns about IPR (if stemming from exploitation of knowledge, innovation); Testing innovative approaches and science policy cooperation; Level of participation in innovative programmes; Engaging with international organizations (if they were useful to the societal actors); Membership of international organisations (IMI..); Synergies with other instruments (ERA-NETs, JPIs, Belmont Forum others) (R&D&I landscape); Roamap Workshops; Annual for policy makers; Dissemination activities (materials, infrastructure);Open acess; No relation between researchers and national representatives*
MC15	Efficiency	Fragmentation LT	***Which are the potential "gains" (e.g., economies of scale, better thematic coverage, …) that the participating countries have achieved (in terms of pooled funding, efforts, …) – if possible with counterfactual data ?***	***systemic gains in terms of unnecessary duplication***	*Calls (if focusing on the gains), MoUs, consortium contracts, tailored agreements; Co-planning actions; Programme harmonisation (if discussed how much have been gained by the harmonisation); Synergies with other instruments (ERA-NETs, JPIs, Belmont Forum others) (R&D&I landscape); Use of technologies in large scale (if the large scale offers gains); Collaboration with the EC and the H2020; Mapping activities,identifying gaps, complementarities and capacities across Europe; Membership of international organisations (IMI..); Knowledge gaps; Structural funds (if in terms of strategic topics)*

Cont.

Table 20: axis: ***Results, Outcomes, Impacts*** (including time span)*; for existing JPIs*

C4.2	Structuring Effect	Internationalisation ST-MT-LT	Which (type of) international cooperation has been induced by the JPI ?	centrality of the topic for third countries - "external" countries interest in commiting	*MoUs, consortium contracts, tailored agreements; Innovative strategies for infrastrucures and tools to support international research activity (in internationalisation in the sense of outside Europe) ; Roadshows (if also in third countries); Data Base Projects ; (if related to third countries); Modelling tools (if outside Europe); Sharing of infrastructures (if third countries involved); Testing innovative approaches and science policy cooperation (involving cooperation extra UE); Trainning and capacity building; Joint translational grant programmes; Knowledge hubs on emerging areas (if third countries involved); Engaging with international organizations (if they were useful to the societal actors); Mapping activities,identifying gaps, complementarities and capacities across Europe; Membership of international organisations (IMI..); Dissemination activities (materials, infrastructure); Knowledge gaps (focus in 3rd countries); Open acess;*
C4.3	Structuring Effect	Alignment ST-MT-LT	Which forms for alignment (on the various levels) have been achieved by the participating actors?	new opportunities for alignment for the commiting countries;	*Calls (if focusing on the agenda setting); MoUs, consortium contracts, tailored agreements; Co-planning actions; Programme harmonisation; Synergies with other instruments (ERA-NETs, JPIs, Belmont Forum others); Collaboration with the EC and the H2020; Strategic platforms for alignment; Mapping activities identifying gaps, complementarities and capacities across Europe; Engaging with international organizations; Portfolio of funded research projects(enabling crossinteraction); Dissemination activities (materials, infrastructure); Structural funds (focus on structural aligning results (not just printing once a common leaflet as dissemination material)*

7.3 Possible improvements of the IG3 criteria framework for JPI follow-up

The IG3 criteria framework has been developed by GPC to be able to assess proposals for new JPIs as well as existing ones in a structured way. It covers all possible aspects relevant to assess a JPI and has proven to be very valuable for the work of this task force. However, it has turned out to be rather too complex and not easy to communicate. Possible ways for simplification and specification could be explored, at least when it comes to analysing already existing initiatives, without changing too much of the initial framework.

Building on the input from JPIs (see paragraph 7.3.1 below) and from the Task Force, a first set of concrete general and Axis-specific recommendations can be considered:

- If the complexity of the evaluation criteria and components is to be kept, then a more user-friendly presentation of the questions is absolutely needed, guiding the assessor on the actual meaning and potential impact of the evaluation to be carried out. More explicit description of columns and codes (MCx.x, Cy.y, inserts in bold red as added questions, etc.) needs to be made evident to the evaluator -and the reader. A better approach to unique questions, with no multiple contents, that may suit better a Y[es]/N[o] answer should be followed.
- A possible approach to overcome the difficulty to collapse a complex judgment into a Yes/No assessment would be the use of a threshold of achievement that defines either option (e.g. above 80% of accomplishment, Y, else N).
- When applying the IG3 criteria framework to specific aspects of the JTI activities (e.g., Long Term Strategy analysis), clear adaptation of the questions and interpretation of assessment values needs to be highlighted.
- Axis “Engagement for existing JPIs”: Make sure that “commitments” and “engagement” are not interpreted the same way as if in undertakings ruled by contractual obligations. In the absence of legally-binding agreements, past performance needs to be used as a gauge of future behaviour too.
- Axis “Governance for existing JPIs “: Questions should focus on how efficient and effective governance is and less on the ambiguous concept of “leadership”

It is recommended that the GPC pursues an IG3 criteria review on the basis of these findings and recommendation and drafts a manual for both assessors and readers.

7.4 Annex 3 The JPI collaboration patterns analysis approach

In section 5, the purpose is to put the activities of JPIs in perspective, within the broad R&I landscape instruments, and illustrate, complementary to the previous analysis, the intensity of their “foundational” hub character and leading role in their field. This can be translated in their collaboration capacity within the European scope instruments - developed under the Framework Programme or within other kind of partnerships - or further in the international arena, and still with instruments on the same thematic band or in adjacent themes.

As mentioned before, this analysis was based on the information contained in the LTS mostly in the section on outreach activities, and also benefitted from additional information delivered by JPIs for a more complete picture. JPIs were responsible for the selection on the most relevant collaborations –

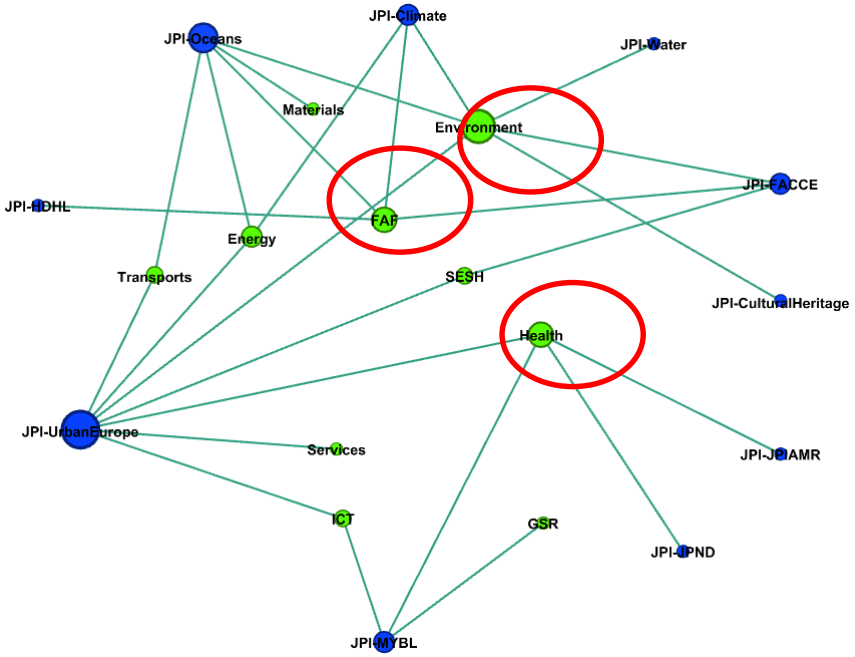
not being feasible to include them all, in some cases, e.g JPI Oceans- and were also invited to comment on the classification displayed by the TF, which is detailed in section 7.4.1.

Two main approaches were followed: a first approach centred on each JPI perspective, and on their selected universe of collaborations, and another approach focused on the system, and on all the JP available instruments in the fields, where the selected collaborations by JPIs intersect. In both cases we have a "picture" on JPP, but in the second one the current JP potential instruments and collaborations can be perceived, the position of the JPI in the field: 1) as a leader/large scale/ long term instrument; 2) in the innovation cycle, more rooted in fundamental research collaborations or more innovation led ones.

This second approach was based on the mentioned information by the JPIs and on the information by ERALEARN, organized by domain thematic areas or "clusters", available at (ERALEARN tool)

We considered as more pertinent the clusters "Food, Agriculture and Fisheries", "Environment" and "Health", given the thematic fields of the 10 JPIs:

Figure: 7.4.1.- Pattern of ERALEARN Cluster on ERA networking instruments



In general, concerning the network charts, the lines represent the existence of a collaboration (effective, - plain green lines)/potential- red dashed lines) and the nodes the intensity (number of collaborations, regardless of their nature). The shared nodes represent the shared initiatives/forums, and are critical points for the JP and JPP phenomena.

7.4.1. Insight on JPIs Collaborations

Aiming at catching the several interactions within different layers and actors of the RDI landscape, which are intrinsic to the JPP, the TF identified the following segmentation on collaborative interconnections:

- Transnational (within Europe)

- Implementation: collaborations allowing for sustainability of governance (secretariats) and implementation of RDI activities of JPIs (as CSAs and ERA-Nets)
- Transversal RDI synergies: collaborations with other joint programming instruments (as JPIs, Articles 185), other instruments and partnerships of the H2020 EIT KICS, EJP, or European associations as COST, others
- Vertical policy synergies: collaborations that engage into the European policies context, as with the EC DGs given their "influential role in helping the JPIs to position themselves within the European societal challenge landscape" (Hernani report). The societal challenge topic for most JPIs can be aligned to one of the thematic Directives of DG Research & Innovation - while the synergies can be more clearly identified as vertical in the case of DG Research and when JPIs are benefitting from CSA´s; collaborations that involve MS delivering strategic advice on the ERA Priority area 2a and on the whole progress towards on the implementation of the ERA and its Roadmap (as GPC an ERAC configuration,)
- Regulatory- industry synergies: involving public regulatory bodies, end users associations, and industry, allowing for a quadruple helix perspective (EDA, EMA, IMI, FVE, others),
- Infrastructures, showing forms of alignment and efficient use of capacities (ESFRI, ERIC, Heritage Science, Copernicus…):
- International (worldwide)

- Global:
  - Political (G7/8, G20, NATO, UN, UNESCO, FAO)
  - Policy driven: OECD, IMF
  - RDI Performer: NIH…
  - Promoter: having RDI Agendas and funding calls, as Belmont Forum WDC, CoEN, others)
  - Infrastructures (IISD; IRSO, RV SONNE)
  -
- Regional (US, Vietnam, Thailand, Taiwan, Brazil, Tunisia, UK, ASEAN, CELAC)
  - Political (E-ASIA))
  - Policy driven: (MUFFP, EULAC)
  - RDI Performer: NIH-, CIHEAM-IAMM, CAUPD, CCUD, COL, POGO, INED, VU, HiOA, AIT
  - Promoter: having RDI Agendas and funding calls (CELAC, CONFAP, CNPq, CAPES, EMBRAPII, ASRT, IRESA, MEST, MoST, NSERC, CCUD, CAUPD, BARDA, GFF, CDC, CARBX; NSFC, CIHR, HRC, USDA, CSIRO, NIH (Funders)
  - Regulator: CDC, EFSA
  - Infrastructures:

7.4.2. Mapping of collaboration patterns of JPIs

Figure 5.2.7.B-Interactions with regional organisations (detail 1)

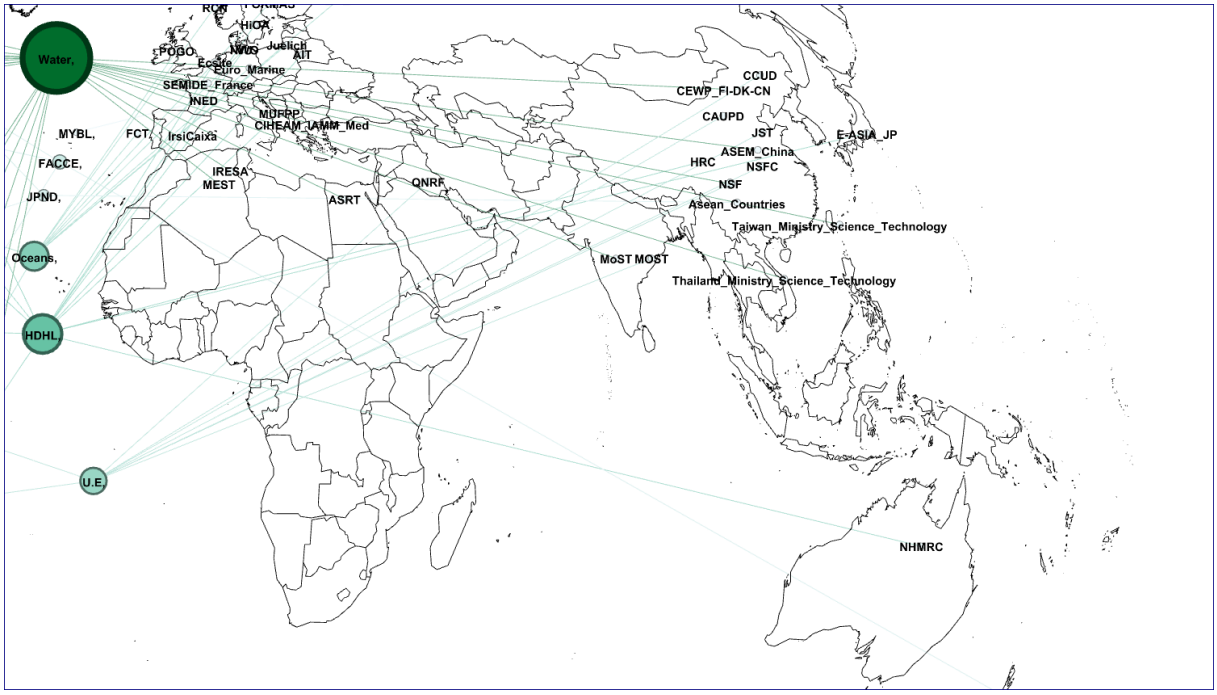


Figure 5.2.7.C-Interactions with regional organisations (detail 2)

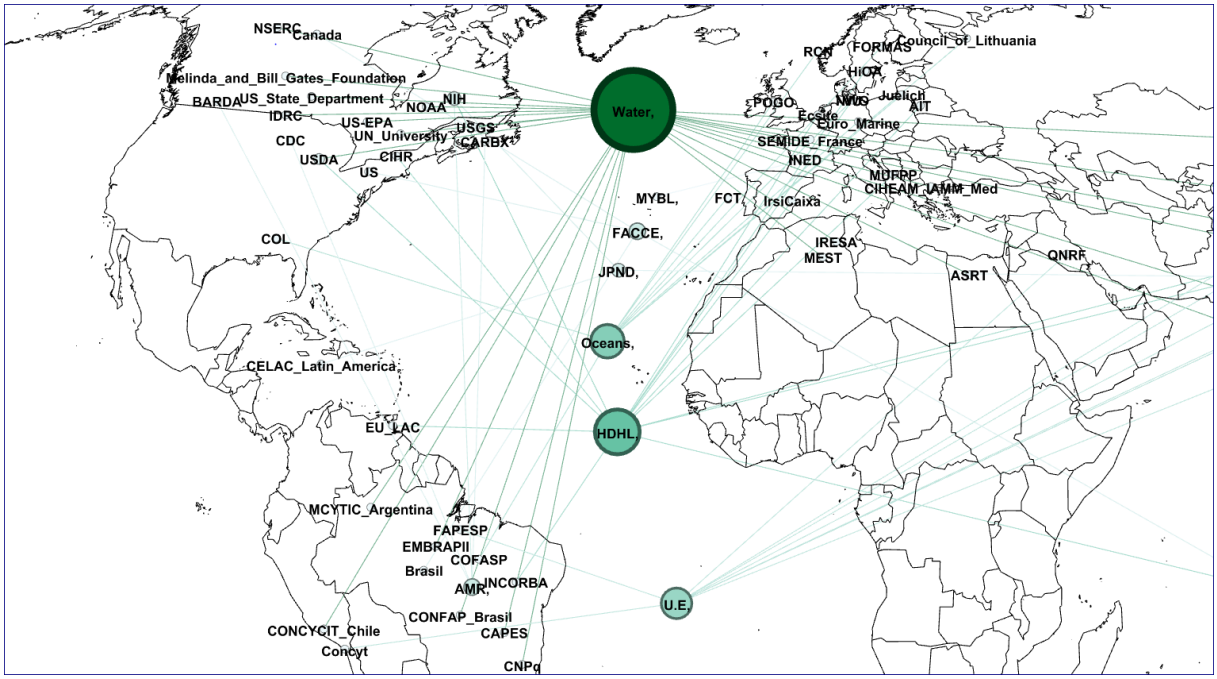
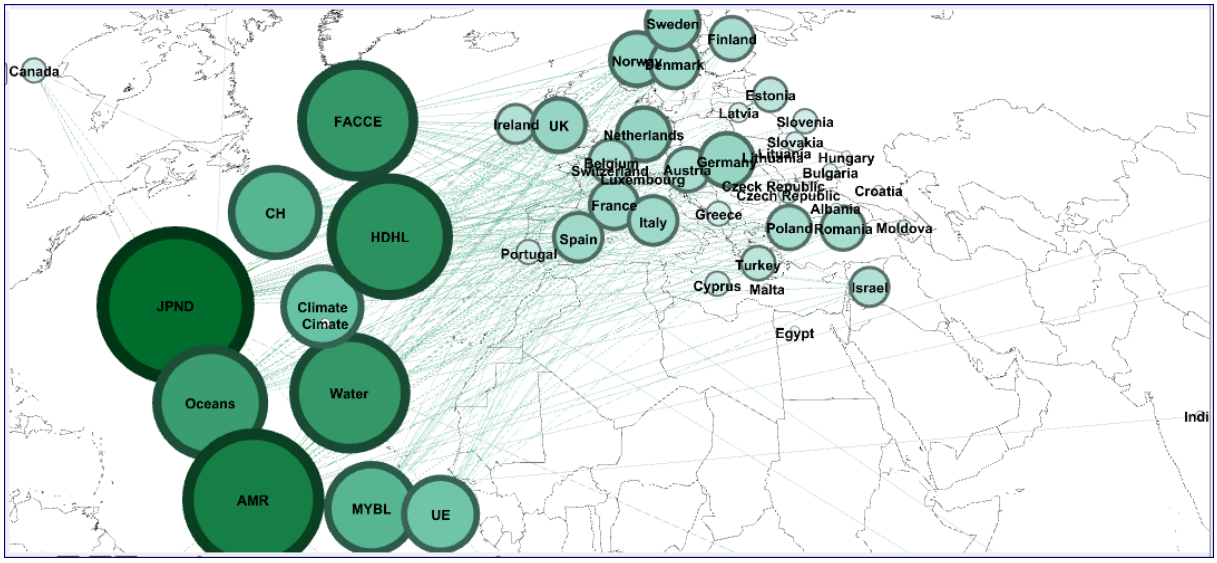


Figure 5.2.8.B –Member Countries, Associated Countries and Observers (detail 1)



7.5 List of abbreviations

AAL	Art 185 initiative on Active and Assisted Living
AC	Associated Country (to the EU-Framework Program)
AFRIALLIANCE	Innovation Alliance for Water & Climate.
AG	Action Groups
AORA CSA	Atlantic Ocean Research Alliance
ASEAN	Association of Southeast Asian Nations
BBMRI	Biobanking and BioMolecular resources Research Infrastructure
BEUC	Bureau Européen des Unions de Consommateurs
BILAT	Bilateral EU cooperation in science technology innovation
BiodivERsA	ERA-Net BiodivERsA
BONUS 185	Joint Baltic Sea research and development programme
CC	Council Conclusions
CCUD	China Centre for Urban Development
CoE	Council of Europe
CORBEL	Initiative of eleven new biological and medical research infrastructures
COST	European Cooperation in Science and technology
CSA	Coordination and Support Action
EASO	European Association for the Study of Obesity
EBRA	Environment-Behavior Research
EC	European Commission
ECDC	European Centre for Disease Prevention and Control
ECRIN	European Clinical Research Infrastructure Network
EDCTP	The European & Developing Countries Clinical Trials Partnership
EFAD	European Federation of the Associations of Dietitians
EFFOST	European Federation of Food Science and Technology
EFPIA	European Federation of Pharmaceutical Industries and Associations
EFSO	European Food Safety Authority
EJP	European Joint Programme
ELIXIR	Intergovernmental organisation for life science resources
EMA	European Medicines Agency
ENOHA	European Network of Hydrological Observatories
ENPADASI	European Nutritional Phenotype Assessment and Data Sharing Initiative
EFPIA (IMI)	European Federation of Pharmaceutical Industries and Associations
ERA	European Research Area
ERA4CS	ERA-Net for Climate Services
ERAC	European Research and Innovation Advisory Committee
E-RIHS	European Research Infrastructure for Heritage Science (E-RIHS)
ESCMID	European Society on Clinical Microbiology
ESFRI	European Strategy Forum on Research Infrastructures
ESFRI / ACTRIS	Aerosols, Clouds, and Trace gases Research Infrastructure Network
ESFRI BMS	ESFRI Biomedical Sciences
ESFRI / ICOS	Integrated Carbon Observation System
ESPEN	European Society for Clinical Nutrition and Metabolism
EUFIC	European Food Information Council

EURAQUA	European Network of Freshwater Research Organisations
EUREAU	European Network of Freshwater Research Organisations
EUREKA	Innovation Across Borders
EWA	European Water Association
FENS	Forum of Neuroscience
FVE	European Veterinary profession
GACSA	Global Alliance for Climate Smart Agriculture
GARD-P	Global Antibiotic Research and Development platform
Glopid-R	Global Research Collaboration for Infectious Disease Preparedness
GPC	High level group for Joint Programming
GWRC	Global Water Research Alliance
ICES	International Council for the Exploration of the Sea
IG3	GPC Implementation Group 3
IG3-Criteria	A criteria framework for the assessment of new JPIs, developed by GPC
IISD	International Institute for Sustainable Development
ILSI	Scientific Partnerships for a Healthier World International
IMF	International Monetary Fund
IMI	Innovative Medicine Initiative
INCOBRA	Science, Technology and Innovation Cooperation between Brazil and EU
IPCC	Intergovernmental Panel on Climate Change
IRSO	International Research Ship Operators
J-Age II	CSA for implementation and alignment activities of the JPI MYBL
JPI	Joint Programming Initiative
JPI AMR	JPI Anti Microbial Resistance
JPI CH	JPI Cultural Heritage
JPI FACCE	JPI Agriculture, Food Security and Climate Change
JPI HDHL	JPI Healthy Diet Healthy Life
JPI JPND	JPI Neurodegenerative Diseases
JPI MYBL	JPI More Years Better Life
JPI UE	JPI Urban Europe
JPP	Joint Programming Process
KIC	Knowledge and Innovation Community
KNSI	Knowledge Network for Sustainable Intensification of Agriculture
LTS	Long Term Strategy
MACSUR	Knowledge Network for Sustainable Intensification of Agriculture
MIUF	Medical Research Infrastructures & Users
MOPACT	Mobilising the Potential of Active Ageing in Europe
MS	EU-Member State
NIH	US National Institutes of Health
NSFC	National Natural Science Fund China
P2P	Public Public Partnership
PLACARD	Platform for Climate Adaptation and Risk Reduction
PPP	Public to Private Partnership
PRIMA	Partnership for Research and Innovation in the Mediterranean Area
R&I	Research and Innovation
RPO	Research Performing Organisation
RV SONNE	German Research Fleet Coordination Centre
SC	Societal Challenge
SRA	Strategic Research Agenda

SRIA	Strategic Research and Innovation Agenda
SUSFANS	European SUStainable Food And Nutrition Security
SUSFOOD	Research and innovation in the field of sustainable food systems
SWOT	Strengths, weaknesses, opportunities, and threats
TAFTAR	US-EU cooperation to reduce the threat of antibiotic resistant germs
TF	Task Force
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	UN Climate Chance Conference
USGCRP	U.S. Global Change Research Program
WCRP	World Climate Change Research Program
WHO	World Health Organisation
WMO	World Meteorological Organisation
WSSTP	Water Supply and Sanitation Technology Platform
WWRP	Washington Wildlife and Recreation Program