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Joint Undertakings: analysis of collaboration mechanisms with ESI Funds in an S3 context

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Abstract

Challenge-driven innovation in the EU calls for closer collaboration between territorial innovation initiatives and non-territorial innovation, in order to build critical mass and take full advantage of synergies and complementarities. This report investigates in particular the motivations and practices for strengthening collaborations between Joint Undertakings (JUs) (focusing on non-territorial innovation) and national and regional ESI Funds' managing authorities (focusing on territorial innovation) and offers guidance to take the necessary steps to start or upscale them.

Collaborations with JUs can also help to optimise the S3 priority setting by refining priorities and positioning them within the European research agendas of the JUs. From their side, JUs can benefit from stronger links with S3 in order to maximise the impact of their agendas and projects, and build more critical mass. Typologies of current collaboration modes are identified, while highlighting bottlenecks and challenges faced in implementation. With a view to further unlock the untapped potential of JUs and ESI Funds' Managing Authorities working together, guidance is provided on the type of actions and initiatives that could be taken to reinforce such alliances.

The practical knowledge about existing mechanisms and their limitations presented in this report can assist in the optimisation of such interactions and lead to more effective implementation of national and regional Smart Specialisation Strategies (S3) and of Joint Undertakings.

This publication is part of the Stairway to Excellence project, funded by the European Parliament, and implemented by the Joint Research Centre in close cooperation with DG REGIO.

1 Rationale for the report

Joint Undertakings (JUs) are a form of public-private partnerships established under Article 187 of the Treaty on the Functioning of the European Union (TFEU) and set up in strategic EU research and innovation areas. They are based on a strong and long-term commitment from industry in close partnership with the European Commission to contribute to research in key areas and to maximise impact. JUs adopt their own research agenda and award funding mainly on the basis of open calls for proposals (European Commission, 2012).

The concept of Smart Specialisation Strategies (S3) is now well established in Europe. A key feature of this concept is the clear thematic focus for research and innovation (R&I) efforts, through the selection of a limited number of priorities. As a result, national and regional public administrations are faced with a challenging question: Which R&I priorities are the best choice for contributing to cohesion (and thus to regional economic growth and to addressing societal challenges)? Collaboration with EU-wide public-private partnerships can contribute to answering this question. Such partnerships often have their own R&I agendas that are widely supported by public and private actors across the EU. If a Member State (MS) or region spends ESI Funds taking into account those agendas, the probabilities for impact can reasonably be expected to be higher than when spending is done in isolation from the wider EU context. Engaging with such partnerships during S3 implementation is also expected to improve internationalisation and business engagement, and to position local investments into relevant international value chains. From the JU side, by working with Managing Authorities (MAs) they can increase their impact and critical mass, by orienting ESI Funds towards their R&I agendas.

This report considers collaboration opportunities between ESI Funds and a particular form of public-private partnerships, the Joint Undertakings (JUs). Conclusions from this report may also have value for alliances with contractual PPPs (cPPPs), although they do not organise their own calls. This report is part of a series of publications from the Stairway to Excellence project that focus on collaboration practices and opportunities between ESI Funds and different forms of European partnerships, be it Public-to-Public partnerships or Public-Private Partnerships (e.g. Collaboration between ESI Funds and EIT Knowledge and Innovation Communities).

Several regions and Member States have started working with JUs that operate in thematic areas related to their specific S3 priorities. However, the modes of collaboration vary between JUs and between territories. Consequently, there is a need to better understand the mechanisms used by JUs to engage with MAs, the actual benefits and difficulties that exist, the lessons learnt from the experience so far, and the potential future activities that could further enhance such collaborations. There are also opportunities for mutual learning between the different JUs themselves as well as between the national and regional authorities.

The main objective of this report is therefore to present a state of play of current collaboration practices and their limitations, in order to support mutual learning across JUs and EU territories. The ultimate goal is to contribute to unlocking the potential benefits of JUs and EU territories working together.

The report is organised around the following sections. After a summary on the methodology used for drafting this report (section 2), section 3 zooms in on the specific interests of Joint Undertaking and national and regional authorities that are working in S3 implementation to engage in a structured collaboration. Section 4 presents an overview of the current status of engagements between Joint Undertakings and ESI funds in a S3 context, including a typology of collaboration modes as well as related bottlenecks in implementing them. Section 5 includes a number of proposals on how to unlock the unrealised potential of partnerships between JUs and ESI Funds' Managing Authorities, by

providing guidance on the type of actions and initiatives that could be taken to reinforce collaboration practices. Finally, a number of conclusions are highlighted.

The analysis presented in this report has been conducted as part of the Stairway to Excellence¹ (S2E) project, which is being implemented by the Joint Research Centre in close cooperation with DG REGIO and which was initiated by the European Parliament. The S2E project aims to support all EU member states and their regions in promoting research excellence, and to stimulate the effective implementation of national and regional Smart Specialisation Strategies (S3), thus contributing to closing the innovation gap that exists between different EU territories. Additionally, the project has been focusing on developing and exploiting the synergies between European Structural and Investment Funds (ESI Funds), Horizon 2020 (H2020) and other EU funding programmes. It first started in 2014 and is envisaged to continue until 2020.

¹ <http://s3platform.jrc.ec.europa.eu/stairway-to-excellence>

2 Methodology

The methodology deployed has included a qualitative approach based on desk research, interviews and participatory sessions.

Desk research

The desk research involved analysis of the annual and multi-annual work plans² and interim evaluations³ of the JUs as the primary source of information related to the following key issues:

- Strategy and policy development and the processes employed;
- Forms of engagement such as cooperation mechanisms with regions;
- Theme/s covered by the JU (according to H2020 fields) and their relation to S3 priority areas;
- Governance systems, including the organisations directly involved in facilitating synergies and the specific mechanisms/bodies used to govern JU-regions relations;
- The engagement process for regions seeking to cooperate with a JU;
- Specificities of JU mechanisms and the unique features not shared with other JUs regarding their collaboration with regions;
- Identification of aspects that could be transferred to other JUs or programmes.

Interviews

In addition, bilateral face to face and telephone interviews were undertaken with representatives from the JU programme offices and in some cases the industrial partners' organisation. The main purpose of the interviews was to gather information about issues that could not be addressed through the desk research and to answer questions that arose through the process of the desk research. The telephone interviews further explored the details of collaborations established with regions, the types of challenges faced, as well as the planned activities to move forward these collaborations. The interview questions can be found in Annex I of this report.

Participatory sessions

Participatory methodologies have played a central role in identifying the needs for specific guidelines to streamline the cooperation initiatives in the context of S3 implementation by member states. The methodology was organised around JU themes to facilitate matchmaking between regional/national public administrations and JUs and to identify the main barriers and bottlenecks that make cooperation difficult. The participatory sessions made it possible to identify more advanced cooperation forms, good practices and their limitations, as well as motivated public authorities willing to strengthen collaboration. The methodology was deployed in the context of two events, namely:

- A seminar with the Member States and Regions on Synergies with ESI Funds in Aviation/Aeronautics⁴, involving CleanSky2 (CS2) on 3 July 2017, where the challenges and the opportunities related to synergies between CS2 and ESI Funds were discussed with around 60 participants from national and regional managing authorities, cluster organisations and also companies involved in the JU activities.

² See European Commission (2018a, 2018b, 2018c, 2018d, 2018e, 2018f).

³ See Atkinson et al. (2017), European Commission (2017), Fontanel et al. (2017), Ravenhill and Bolic (2017), Syrota et al. (2017) and Wohlgemuth et al. (2017).

⁴ <https://www.cleansky.eu/event/workshop-with-the-member-states-and-regions>

- A match-making event "Developing synergies between Joint Undertakings and ESI Funds for optimising S3 implementation"⁵ in Brussels on the 7th of March 2018, with around 180 participants including regional and national Managing Authorities and around 35 EC staff from 6 different European Commission DGs. The main event objectives were to bring together JUs with relevant regional stakeholders from the EU28 member states and regions to better understand the JUs' ways of working (with a particular focus on creating synergies between funds), to share and discuss good practices and specific challenges in implementing collaborations, as well as to engage in match-making for the development of future activities. The event also included parallel discussions aimed at fostering interaction between JU representatives and regional/national administrations. Topics discussed included not only synergies between ESI Funds and JU calls, but also needs for capacity building at the regional level in order to improve the potential to participate in H2020, for raising awareness and building research and education capacities, and for engaging with firms.

The expected outputs from the parallel sessions at both events were centred on:

- The **mechanisms** promoted by regions and JUs to establish collaborations;
- The **benefits** of collaboration and the **difficulties** faced in implementation;
- **Future** activities that could be promoted to improve or reinforce such collaborations.

The questions discussed during both events included:

- What are the benefits of collaboration between regional authorities and JUs?
- How would your region like to collaborate with a particular JU (matchmaking)?
- What types of mechanisms exist that regional authorities are promoting to collaborate with JUs?
- Which good examples exist of regions collaborating with JUs through mechanisms other than MoUs or broader in scope?
- What type of difficulties or bottlenecks do regions face in implementing such collaborations, and which issues are related to the thematic areas covered by the JUs? What are alternative solutions to these bottlenecks?
- Are there specific difficulties addressed by EU13 countries and what are differences compared to EU15?
- How can regions not yet participating become more engaged or start collaboration?
- What are the ways to improve or expand the collaboration of regions with JUs in the future?

⁵ <http://s3platform.jrc.ec.europa.eu/-/developing-synergies-between-joint-undertakings-and-esif-for-optimising-ris3-implementation?inheritRedirect=true&redirect=http%3A%2F%2Fs3platform.jrc.ec.europa.eu%2Fhome>

3 Motivations for collaboration

3.1 Context

3.1.1 Creating synergies

Different types of EU funds have different primary goals: territorial cohesion (ESI Funds) and excellence (H2020). However, it should be noted that, while there are different primary goals (territorial versus non-territorial), the ultimate objective of both is the same, namely increasing competitiveness leading to more jobs and growth and at the same time contributing to addressing societal challenges.

Within the context of the JUs, synergies can be created not only through the use of ESI Funds in a combined or complementary way with JU project funding but also at a more strategic level, through the alignment of research agendas and S3 priorities. This can include the development of training activities or funding of infrastructure as part of the S3, in complement with JU activities (upstream). Or complimentary projects can be developed that act as test-beds for technologies developed under the JUs activities, demonstrating their potential for scaling-up (downstream).

In the next sections we first look at the different JUs and their policy context, as well as the state-of-play of their implementation. Section 3.2 then considers motivations for collaboration from three different perspectives: the European Commission's perspective, the JUs' perspective, and the national and regional authorities' perspective.

3.1.2 Joint Undertakings and their policy context

The European Union public-private partnerships implemented through Joint Undertakings (JUs) for the purpose of research and innovation were first established under the Seventh Framework Programme (FP7) with two major aims: firstly, to address fragmentation and aggregate research efforts of the public and private sectors across the European Union; secondly, to increase the public and private investments in research and innovation towards the EU target of 3% of GDP. More generally, the setting up of public-private partnerships was intended to ensure the leading role of industry in defining strategic research agendas in key competitive areas for the future of European research and innovation and to address the valley of death with a faster introduction of innovations into the market. The strong engagement of industrial players in the research agendas of JUs has some parallels with the development of S3 through the Entrepreneurial Discovery Process (EDP) that aims to include all relevant stakeholders in the strategy development and refinement.

All the Joint Undertakings (JUs), except SESAR, are also Joint Technology Initiatives (JTIs)⁶ with a major novelty being the governance mode of a public-private collaboration instrument that is partly funded by the EU framework programme (i.e. FP7 or H2020) and by the industry members. As a legal entity in its own right, each JU⁷ has a specific programme office with dedicated staff to manage the different activities, including the launch of calls for proposals and the follow-up of funded projects. The private sector involvement in the JU governance structure ensures the financial engagement of industry in EU relevant research and innovation activities, and the involvement of industry in the definition of future research and innovation topics that are part of the JUs strategic research agendas. The JUs governance structure also includes the State Representatives Group (SRG), aiming to reinforce the synergies with national programmes and activities⁸.

⁶ There are six Joint Technology Initiatives (JTIs) managed by dedicated entities called Joint Undertakings, established under Article 187 of the Treaty on the Functioning of the European Union (TFEU). The seventh Joint Undertaking, SESAR, was established in 2007 as a 'Union body' rather than a JTI due to its specific policy-oriented activities in relation to the Single European Skies initiative. Its duration was extended for the 2014-2020 period of Horizon 2020. See <https://ec.europa.eu/research/evaluations/pdf/sesar2020.pdf>.

⁷ This report will use the term Joint Undertaking (JU) as the interest is in the activities of the actual legal entity rather than the instrument (JTIs and 'Union body').

⁸ Regional authorities that wish to be involved in an SRG can get in touch with their national representative.

The JUs define their own research priorities through the periodic publication of a strategic research (and innovation) agenda that defines the future research and innovation areas in which they are going to focus their activities. Those agendas provide a very useful reference framework for regional and national administrations to explore complementarities between their territorial strategies and the different JUs.

The period 2014-2020 has introduced a renewed impetus for JUs, addressing some of the challenges identified in the previous period, with a stronger commitment from industry, more targeted and ambitious objectives, more clearly defined impact and expected measurable results and closer monitoring and evaluation of the activities. The novelty of introducing the JUs' calls for proposals under the Horizon 2020 programme rules has also addressed an important issue, pointed out by previous beneficiaries, related to scattered calls with different rules and templates for submission. The 2014-2020 period has underlined the relevance of developing closer links and synergies with national and regional programmes. More specifically, exploiting synergies with European Structural and Investment Funds (ESI Funds), often in the context of the implementation of Smart Specialisation Strategies (S3), has been introduced among the JUs' objectives.

The proposal of the European Commission for the next multi-annual financial framework within Horizon Europe programme (European Commission, 2018) underlines the support for joint public-private programmes such as the Joint Undertakings, as well as the enhanced focus and impact of programmes seeking more synergies with other EU instruments and policies. More specifically, the proposal highlights the importance of synergies with the European Regional Development Fund (ERDF) part of the ESI Funds to support the bridge between smart specialisation strategies and international excellence in research and innovation. In parallel, the EC proposal for the future European Regional Development Funds (ERDF) (European Commission, 2018) also underlines the importance of enabling consistency with the Horizon Europe programme.

3.1.3 Overview of Implementation of Joint Undertakings

The individual JUs differ substantially in terms of their JUs objectives, targets and funding, which to some extent determines the way collaborations with Member States and regions are being deployed⁹. Table 1 illustrates the general characteristics of the seven existing JUs, namely: Bio-based Industries (BBI); Fuel Cells and Hydrogen 2 (FCH2); Clean Sky 2 (CS2); Electronic Components and Systems for European Leadership (ECSEL); Shift2Rail (S2R); Single European Sky ATM¹⁰ Research (SESAR); and Innovative Medicines 2 (IMI2). The characteristics explained include: year of creation, general objectives, Technology Readiness Levels (TRL) targeted, and the Total Budget (see Table 1).

With respect to the maturity of the JUs, four of them were established in 2007-2008 (FCH, CS, SESAR and IMI) and three in 2014 (BBI, ECSEL and S2R). The objectives are quite different from one JU to another. Regarding TRL, according the 2018 Work Programmes most of JUs fund projects that range from 1-3 to 6-8. In many cases a minimum starting TRL is required, and a target TRL is defined that should be achieved by the end of the project. The smallest budgets in 2018 correspond to FCH2 (€82,408,640) and S2R (€84,756,482), while the highest ones are associated to CS2 (€295,673,799) and IMI2 (€275,644,457). The medium sized budgets are those linked to BBI (€120,233,525), ECSEL¹¹ (€187,200,000) and SESAR (€153,437,961).

⁹ For instance, some JUs may seek a wide collaboration with as many territories as possible, whereas others prefer setting up cooperation with a selected number of places.

¹⁰ Air Traffic Management (ATM)

¹¹ The actual budget can in some cases be higher. For ECSEL JU for example, due to the tri-partite funding model, which includes contributions to project funding by the ECSEL Participating States, Private members and Horizon 2020 and ESIF, and contributions by the Private members and EU to the administrative costs, the actual figures to support RD&I actions are in reality significantly higher than the reported EU budget alone. The operational and total budgets for 2018 for ECSEL JU, taking into account all these contributions, reach 797,804,947 and 803,004,948 EUR respectively.

Table 1: Overview of JUs

JU	Year of creation	Objectives	TRL at end of project (based on WP 2018)	Operational budget (€) (excl. admin & staff) 2018	Total Budget 2018 (€)
BBI	2014	Resource efficient and sustainable low-carbon economy through sustainable and competitive bio-based industries in Europe based on advanced biorefineries that source their biomass sustainably.	Research & innovation actions: 4-5 Demonstration actions: 6-7 Flagships actions: 8	114,832,447	120,233,525
FCH2	2008 (FCH1) 2014 (FCH2)	Develop clean, efficient and affordable solutions that fully demonstrate the potential of H2 as an energy carrier and fuel cell as energy convertor.	Research & Innovation actions: 3 Large Scale Demonstration actions: 8	76,946,740	82,408,640
CS2	2008 (CS1) 2014 (CS2)	Contribute to research aimed at reducing CO2, gas emissions and noise levels produced by aircraft by strengthening European aero-industry collaboration, global leadership and competitiveness.	Key technologies (emerging concepts): 2-3 Reviewed Concept: 6	284,480,830	295,673,799
ECSEL	2014	Research, development and innovation projects on Electronic components and systems/ key enabling technologies (KET) which are essential for Europe's competitive leadership.	Application-oriented projects: 2 - 4 Research & Innovation projects: 3 - 5 Innovation projects: 5 - 8 Production-related projects: 5 - 8	182,000,000	187,200,000
S2R	2014	Foster research and innovation in the railway sector. Achieve a Single European Railway Area (SERA); to enhance the attractiveness and the competitiveness of the European railway system to ensure a modal shift from roads towards a more sustainable mode of transport such as rail.	<u>Proposals from JU members</u> Virtual certification & smart planning: 3 Technology demonstrators/ Research: 5 or 6 <u>Proposals from non-JU members</u> Exploratory research and knowledge transfer: 2 Projects for various technology analysis, assessment and validation: 3 to 5/6	81,373,403	84,756,482
SESAR	2007 Amended in 2014	SESAR Joint Undertaking (SJU) is a key enabling organisation for the modernisation of European and global air traffic management (ATM), coordinating and concentrating all ATM-related R&I efforts in the EU.	Development of new services: 2-4 Other services: 4-6	143,921,427	153,437,961
IMI2	2008 (IMI1) 2014 (IMI2)	Speed up the development of, and patient access to, innovative and more efficient and effective medicines and treatments, particularly in areas where there is an unmet medical or social need.	-	600,900,222 (both EU & Industry contribution)	611,213,222 (both EU & Industry contribution)

Source: Authors' own elaboration based on data 2018 Work Plan of different JUs and information on the JU website

3.2 S3 and JUs motivations for collaboration

S3 places a strong emphasis on the mobilisation of the full range of actors to develop and refine Smart Specialisation strategies. However, in some Member States and regions, involving private stakeholders, university actors or civil society in research and innovation policy-making has been limited because of a lack of mechanisms and experience to undertake such engagement. The public-private partnerships generated by the Joint Undertakings are active networks that could provide a basis on which to create new forms of sustainable cooperation and funding arrangements that help mobilising multiple stakeholders required to drive the research and innovation process and refine S3 at the Member State and regional levels.

Certain characteristics of the industry led partnerships make JUs an interesting mechanism to promote synergies between H2020 and ESI Funds through collaboration between JUs and public authorities of MSs and region. Such characteristics include the following:

- They provide a governance structure that pools an important critical mass from the private sector and has strong links to national and regional activities;
- They are largely industry driven, mostly targeting higher and closer to market TRLs, therefore potentially of more direct interest for downstream complementary activities for the scaling-up and test-bedding of project results;
- The autonomy of JUs to set up their own research agendas within the relevant Union policies provides them with valuable flexibility and a framework to establish closer links with regional and national initiatives;
- The challenge of involving industry in S3 could potentially benefit from the JU dynamics and governance with strong involvement of the private sector.
- They are EU-wide initiatives, involving key stakeholders that are part of international value chains; linking territorial investments to those value chains can be of strategic interest to MSs and regions. They also offer access to a wide scientific community involved in the development of advanced technologies.

In addition to these overarching rationales for collaboration between national/regional authorities and JUs there are other rationales that are particular to specific stakeholders. Therefore, this section highlights the specific motivations and interests for such collaborations from three different stakeholders' perspectives:

- the European Commission;
- the JUs ; and
- the National/regional authorities managing ESI Funds and coordinating S3 design and implementation.

3.2.1 European Commission's perspective

Regional partnerships will become increasingly important in achieving EU goals

The S3 ex-ante conditionality introduced an important novelty in the definition and implementation of regional research and innovation strategies by creating bottom-up, participatory processes, which builds critical mass based on knowledge co-creation processes with the involvement of industry and education and research institutions. The importance of introducing an outward looking perspective in S3 has proved to be highly beneficial in identifying and narrowing down their own priorities in line with territorial specificities, but is also challenging due to the limited capacity of certain regions to build international partnerships.

The JUs mobilise public and private entities by seeking strong engagement from big companies and SMEs and are therefore particularly relevant in order to support and broaden the implementation of regional innovation strategies based on S3. Meanwhile, the Entrepreneurial Discovery Process (EDP), as part of the smart specialisation activities, can help creating the conditions to mobilise resources and capacities within regions that otherwise would not be possible.

In this sense, both JU public-private partnerships and the EDP processes and partnerships activated by S3s are mutually beneficial. In combining the EU-wide agendas of JUs with the bottom-up priority setting of MSs and regions, each territory can contribute to achieving EU goals in the way it is best placed to do so.

Promoting synergies can improve the implementation and management of existing funding programmes

The ESI Funds' Managing Authorities can find it challenging to implement synergies in practice, and face difficulties related to State Aid rules, lack of engagement in international networks, and weak research and innovation capabilities, all of which contributes to a low capacity to participate in H2020 calls.

The active promotion of synergies between ESI Funds and H2020 can improve the strategic and efficient use of existing funding programmes and increase their impact. The mechanisms that JUs are developing to engage in closer collaborations with regions are of particular interest and can provide new insights about how synergies between different funds can be operationalised.

Understanding how JUs are working in building synergies is an excellent example for other programmes and initiatives to learn from (such as ERA-NETs, contractual Public-Private Partnerships, EIT Knowledge and Innovation Communities, etc.). In addition, mutual learning activities could provide the framework for regions to exchange views on how to promote synergies, and learn from regions with more experience. Such activities can help promote the EC objectives with respect to synergies between different funds.

3.2.2 Joint Undertakings' perspective

Collaboration with regions can maximise the impact of the JU's agenda and projects

The ultimate aim of JUs to engage with regions is to achieve higher impact with the strategic research agenda as well as with the projects funded through JU calls for proposals. Therefore, the signature of a MoU can be a first step towards creating concrete and tangible results from collaborating with regions, and help in building critical mass. This is particularly relevant because the ambitions of research agendas are usually much bigger than the funds available within each JU.

Achieving critical mass calls for involvement of territories across the entire EU, but might require capacity building

In general there is low participation in JU calls by EU13 countries and regions. Increasing their participation would require capacity building to reinforce the research and innovation systems and to address challenges associated with the lack of experience in establishing international cooperation activities and networks. Regions may use ESI Funds to build such capacity. A particular effort may be needed to raise awareness about the possibilities and benefits of using ESI Funds to this end. Other non-research related areas where ESI Funds could be used to build capacity concern deployment and market uptake.

3.2.3 Regional authorities' perspective

Collaborations can embed local investments in international value chains

It is of strategic interest to MSs and regions to find ways to position their R&I investments along international value chains and move projects higher up on the Technology Readiness Level (TRL)¹² scale, in order to bring them closer to the market. As JUs are industrially driven initiatives, they can help in establishing such links. Also interregional collaborations can be linked to JU activities and their EU-wide networks.

Collaboration can support alignment, refinement and market-orientation of S3 priorities

Regions can also use the collaboration with the JUs as guidance on how to refine and align their S3 priorities and how to make them more specific and market oriented. In this sense, both JUs and regions can use these collaborations as an opportunity to create added value at EU level.

The flexibility offered by JUs' calls for proposals, facilitating the combination of the ESI Funds and H2020, primarily lies in the fact that proposals are selected based on the relevance and strategic nature for the JU strategic roadmap priorities. Such roadmaps and work programmes are primarily defined by industry members based on extensive consultations with public and private stakeholders, therefore ensuring market relevance. In addition, the interests of Member States, through the States Representative Group advisory board, are collected for the smooth progress and strategic orientation of the work programme. In sum, the JU governance structure with industry and Member States supports synergies with other R&I funding mechanisms and connects JU funded projects with local capacities and projects.

Building regional capacity can allow regions to catch up and increase excellence

Close collaboration between JUs and regional administrations can be very beneficial in terms of identifying capabilities, infrastructures, key stakeholders and priorities areas required within regions, as well as the creation of the right framework conditions for innovation. This can include entrepreneurship, mobility and training, start-up programmes, etc. This can also help in the definition and identification of potential areas of cooperation with JUs and ultimately in both improving S3 impact and increasing excellence.

JUs can offer access to international networks and leading companies

In addition, by accessing JU calls, regions can benefit from the access to international networks, which may be as important as access to the funding. Through these networks, they can benefit from positioning their activities within the context of JU R&I agendas and connecting their SMEs to large enterprises.

4 Current status of collaboration between Joint Undertakings and ESI funds in a S3 context

This chapter looks at current modes of collaboration already in place (section 4.1), and considers bottlenecks and critical success factors in implementing them (section 4.2).

4.1 Typology of collaboration modes

In recent years a number of collaboration practices have been developed between JUs and public authorities of EU Member States, regions, and also municipalities and cities. Different JUs have different levels of experience, and also apply a variety of modes for collaboration. This section provides an overview of those different ways of working, both for the benefit of public authorities interested in setting up collaboration and for JUs that wish to improve their understanding in relation to the practices of other JUs.

We distinguish between collaboration modes at the strategic level and at the operational level:

- The *strategic level* refers to the general framework that identifies the conditions for the collaboration between JUs and public authorities.
 - The *operational level* is understood as referring to the concrete ways to operationalise the collaboration. Operational collaboration modes can be funding related or non-funding related, depending on whether the collaboration activities involve funding schemes managed by one or more of the partners involved, or not.

4.1.1 Strategic Collaboration Modes

The strategic collaboration modes observed between JUs and national/regional Managing Authorities are presented in Table 2. It should be noted that the referred strategic modes may be implemented through the operational modes described later in this section.

Table 2: Strategic modes of collaboration between JUs and national and regional public authorities

Collaboration mode	Description	Examples of JUs
2.1: Individual Memorandum of Understanding (MoU)	<ul style="list-style-type: none"> • MoU between a Managing Authority of a Member State, region, or municipality and a JU 	<ul style="list-style-type: none"> • CS2, FCH2, ECSEL, S2R
2.2: Collective Memorandum of Understanding (MoU)	<ul style="list-style-type: none"> • MoU or Letter of intent signed between the JU and a group of regions 	<ul style="list-style-type: none"> • BBI
2.3: National Grant Agreement	<ul style="list-style-type: none"> • National commitments to a call for proposals through the national ESI funds 	<ul style="list-style-type: none"> • ECSEL
2.4: No formal agreement	Informal collaboration through: <ul style="list-style-type: none"> • Liaising with the State Representatives Group of a particular JU • Regional actors involved in the JU (a cluster, a company, RTO...) • Developing direct informal operational collaboration activities with the JU 	<ul style="list-style-type: none"> • All JUs • BBI • BBI

The most common mode is the individual Memorandum of Understanding (MoU) signed with individual regions, which is currently applied by four JUs. The example of the Carinthia Region, Austria, who signed a MoU with ECSEL JU is shown in Box 1. BBI currently uses no individual MoUs but works in close collaboration with its private

partner, BIC, to develop synergies with regions and has made use of a collective MoU with a group of Polish regions (see Box 1). Another interesting mode of collaboration is applied by ECSEL JU, through the use of national grant agreements. The agreements include a commitment for national funding, to be used for participating in calls for proposals from the JU. Selected projects may engage complementary activities supported by the national ESI funds (an example is provided in Box 1). Finally, also cooperations exist without prior formal agreement.

Box 1: Examples of strategic collaboration modes from Table 2

2.1: ECSEL - Carinthia Region

The Operational Programme (OP) for the Carinthia Region of Austria makes provisions for developing research infrastructures in an international context, business investments in research, development and innovation, and preparation of SMEs for growth and innovation processes.

The Region's MoU¹³ with ECSEL agrees to the following within the context of the OP:

- Identify common priorities and synergies between their funding instruments;
- Establish a working group on S3 related to electronic components and systems to explore monitoring and follow-up systems;
- Mutual promotion of each other's activities through their dissemination channels;
- Seek alignment of regional initiatives and national strategies in the research area.

2.2: BBI collective Letter of Intent with Polish regions

The Lodz Declaration of Bioregions, signed 6 October 2016, was part of an effort to integrate regional efforts to build local biocommunities by focusing on common priorities and strategies. Alongside the publication of the Lodz Declaration, the Bio-Based Industry Consortium (BIC), BBI JU and eight Polish regions signed a Letter of Intent to develop new bioeconomy partnerships.

The Lodz Letter of Intent paves the way for regional actors to identify synergies between financial instruments and political frameworks to set up local bioeconomy value chains. All of the regions selected the bioeconomy as a smart specialisation strategy (S3), ensuring limited resources are channelled into the sector.

2.3: Romanian participation to ECSEL calls

Following the selection of research and innovation projects, the activities of the Romanian partners can be funded using ESIF. The Romanian participant(s) to the ECSEL JU project can submit a complementary project for RO-ECSEL funding. These RO-ECSEL projects are funded through the Competitiveness Operational Programme 2014-2020, Axis 1, Action 1.1.3 Creating synergies with research, development and innovation actions within H2020 of the EU and other international programmes of RDI.

The financial assistance for an RO-ECSEL project cannot exceed 1.3M€ and the costs of Romanian participants are only eligible after signing contracts under the Competitiveness Operational Programme. Participants that receive their funding through RO-ECSEL cannot also receive funding from the ECSEL JU for RDI activities funded by ESIF. Further details can be found in the 2019 ECSEL Work Plan¹⁴.

¹³ The MoU is available at: https://www.ecsel.eu/sites/default/files/2017-09/mou_carinthia_en.pdf

¹⁴ http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/jtis/h2020-wp19-ecsel_en.pdf

4.1.2. Operational collaboration modes: funding related

A collaboration mode is considered funding related when the collaboration activities involve funding schemes managed by one or more of the partners involved. The different modes are presented in Table 3.

Table 3: Operational modes of collaboration (funding related) between JUs and national/regional/local public authorities

Collaboration mode	Description	Examples of JUs
3.1: Capacity building (upstream)	<ul style="list-style-type: none"> • ESI Funds support for regional development of skills, infrastructure or other capacities in preparation of planned participation to a JU call. 	<ul style="list-style-type: none"> • CS2 • BBI
3.2: ESI Funds funding for deployment (downstream)	<ul style="list-style-type: none"> • Use of ESI Funds to fund deployment of technologies resulting from the JU projects 	<ul style="list-style-type: none"> • FCH2
3.3: ESI Funds for complementary R&I activities under the topics of the JU	<ul style="list-style-type: none"> • It concerns complementary activities, only funded by ESI Funds, and which are linked to a project funded by the JU or to an R&I area of intervention. 	<ul style="list-style-type: none"> • CS2 • ECSEL

Two examples, upstream and downstream initiatives, funded under ESI Funds are presented in Box 2. The first one builds upstream capacity and focuses on preparing for future participation in a JU activity, such as an open JU call. In Wales ERDF was used to build capacity in the BioComposites Centre of Bangor University in view of a future participation in BBI. The second one represents an example of downstream collaboration through funding from the ESI Funds and is a case related to the FCH2 JU. The JU has developed collaborations through the set-up of joint projects with public authorities (focusing on deployment of vehicles and infrastructure), combining funding from the JU and from national, regional and local authorities, bus operators and the EIB. An example of such downstream project-based collaboration is shown in Box 2.

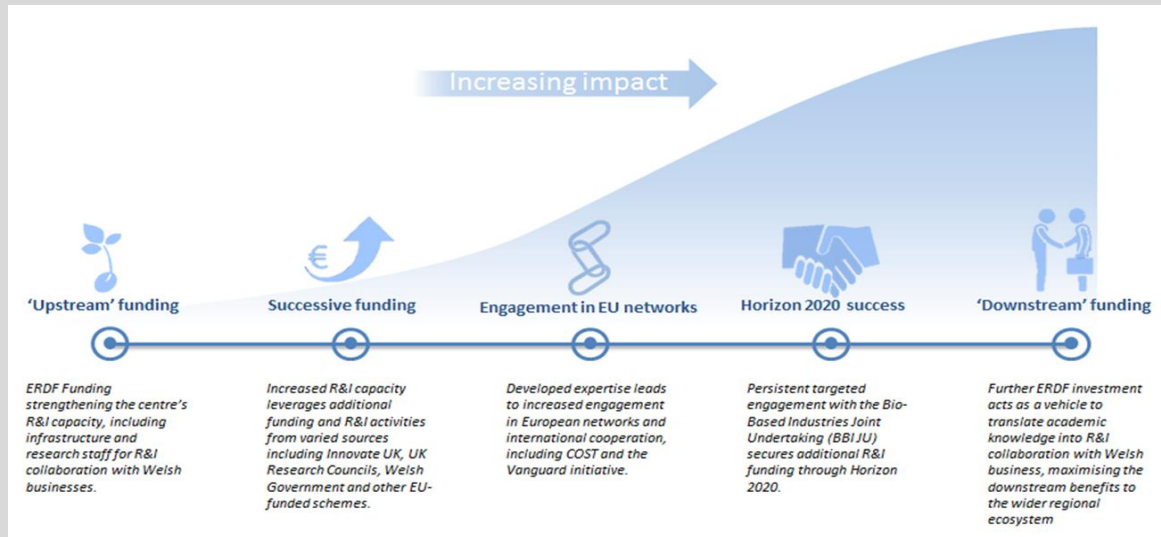
ESI Funds can also be used for R&I activities that are complementary to the topics in an open call from a JU. Examples include CS2 and ECSEL. CS2 uses a synergy label for this purpose (see Box 3), while ECSEL grants the funding as part of the initial call (see Box 1 as this is based on a strategic collaboration mode). In specific CS2 cases, where it is technically appropriate, highly ranked proposals as a result of a JU call (but not funded due to the limitations of available budget) can also be supported with ESI Funds through the "Clean Sky 2 Synergy Label" complementary activities' mechanism.

Finally, additional activities can be funded that are outside the work plan of the JU, but that fit the overall objectives of the JU. Such activities are already implemented by FCH2 JU, CS2 JU, S2R JU and BBI JU. These activities are usually funded by the industrial partners but some JUs (CS2 and BBI) suggested during interviews that ESI Funds could also be used.

Box 2: Examples of operational collaboration modes – funding related: Capacity Building (upstream and downstream) from Table 3

3.1: BBI - BioComposites Centre, Wales (upstream)

The BioComposites Centre of the Bangor University in Wales (UK) undertakes collaborative research to develop sustainable bio-based technologies.



(Source: Information provided by the Welsh European Funding Office)

3.2: FCH project use of ESIF funding for deployment (downstream)

The Project JIVE/MEHRLIN¹⁵ (FCH JU Call 2016) is based on the deployment of Fuel Cell buses in nine cities. JIVE (Joint Initiative for hydrogen Vehicles across Europe) is a FCH JU grant funded (€32M) project deploying 144 zero emission hydrogen buses across five member states. The MEHRLIN project (Models for Economic Hydrogen Refuelling INfrastructure) is co-funded by the European Commission's Connecting Europe Facility (€5.5M). It aims to deploy seven hydrogen refuelling stations serving bus fleets in cities across Europe, in the UK, the Netherlands, Italy and Germany. Funding has also come from other sources including:

- National funding programmes and support in UK, Germany and Denmark;
- Regional/Local funding most relevant in Italy (the H2 Centre in South Tyrol is financed through ERDF¹⁶);
- The City of Riga secured European Investment Bank (EIB) financing.

¹⁵ Further information is available at: <https://www.fch.europa.eu/project/joint-initiative-hydrogen-vehicles-across-europe> and <https://www.fuelcellbuses.eu/projects/mehrlin>.

¹⁶ See: <http://www.h2-suedtirol.com/en/>

Box 3: Examples from CS2 of operational collaboration modes – funding related: ESI Funds for complementary R&I activities under the topics of the JU from Table 3

3.3 Clean Sky 2 Synergy Label

The 'Clean Sky 2 Synergy Label' may be awarded to complementary activities proposed by either a successful applicant in a Clean Sky 2 (CS2) call or proposed by a CS2 beneficiary over the course of implementation. The label is awarded following an independent evaluation process of the complementary proposals against the H2020 evaluation criteria and the relevance in terms of synergies/complementarity to the Clean Sky 2 scope or objectives.

The 'Clean Sky 2 Synergy Label' can provide an incentive effect and a guarantee of success for MS/Regions to invest in projects, support actions, local capabilities and infrastructures of national and/or regional importance. This label and the accompanying CS2 evaluation summary report of the complementary proposal may be considered by the relevant Member State Region in accordance with the applicable rules¹⁷.

Specific example of Clean Sky 2 complementary activities - Andalucía, Spain

As part of the Andalusian Promotion Programme for International R&D&I there are Complementary Actions linked to Clean Sky 2 calls. Through such actions synergies are created with ESIF by broadening the scope of CS2 projects, adding parallel activities and continuing work that has already been supported in order to build and enhance capabilities and skills.

Such complementary actions should be linked to a CS2 project that received the maximum score in the evaluation and that was funded as part of the CS2 call. The complementary action itself should also receive a favourable assessment from CS2 in order to be funded by ESIF. The action must also include an Andalusian firm that participates in a CS2 call for proposals funded project.

Therefore, it concerns in all cases an additional project (always R&D focused). It can consist of a successive project where the additional project builds on the initial project, or a parallel project complementing the main one. It is, therefore, part of the *strategic planning* to help achieve *long term objectives* rather than just a combination of funds.

(Source: Information provided by the Agencia de Innovación y Desarrollo de Andalucía (IDEA))

¹⁷ For more details see: <http://www.cleansky.eu/memorandum-of-understanding-with-clean-sky-2>.

4.1.3 Operational collaboration modes: non-funding related

A second type of operational collaboration mode, represented in Table 4, is one not directly related to a funding source managed by one of the partners and used to encourage mutual collaboration. However, even if a direct funding instrument is not involved in this collaboration mode, it usually requires a governance structure and knowledgeable human resources to facilitate them.

Such non-funding related modes can include awareness raising activities used by JUs, or promotion activities by regions to industry through the use of a promotional fiche and the organisation of visits to the region. Workshops or roadshows to promote JU calls in targeted regions, or to promote best practices, are considered as well. Other mechanisms include the organisation of regional or interregional joint working groups with the JU, and the provision of guidance on available funding within the objectives of the JU. Examples of specific non-funding related collaborations are presented in Box 4.

It should be noted that the non-funding related activities described can lead to further more tangible outcomes. An example of this concerns the FCH2 JU, where such activities have led to the inclusion of topics in a call for proposals and to the launch of a Project Development Assistance facility to help develop detailed project plans in regions and cities, with a special attention to Central and Eastern Europe. The same FCH Cities and Regions Initiative led by the FCH2 has also led the Regions to set up a new thematic interregional partnership on Fuel Cells and Hydrogen within the Industrial Modernisation S3 Platform.

Table 4: Operational modes of collaboration (non-funding related) between JUs and national and regional public authorities

Collaboration mode	Description	Examples of JUs
4.1: Awareness raising	<ul style="list-style-type: none"> Regions promote participation of regional business in JUs (through open calls or through public procurement) JUs develop communication tools (e.g. information days) and activities to raise awareness on the potential of JU – ESI Funds synergies 	<ul style="list-style-type: none"> CS2(roadshow, joint workshops) BBI (promotion fiches, visits to regions, guidelines) FCH2 IMI2
4.2: Joint working groups at regional or interregional level	<ul style="list-style-type: none"> General and thematic working groups at regional level to exchange information on regional capabilities and policy priorities Interregional working group to connect actors across regions and sectors along new value chains 	<ul style="list-style-type: none"> CS2(Regional working groups) BBI (Interregional working group with Vanguard Initiative and ERRIN)
4.3: Funding guidance	<ul style="list-style-type: none"> Ways to collect and disseminate funding opportunities aiming to optimise synergies between funding from different sources 	<ul style="list-style-type: none"> FCH2 (online funding tool)

Box 4 gathers a number of examples that can inspire the different type of non-funding related collaboration modes included in table 4.

Box 4: Examples of operational collaboration modes – non-funding related from Table 4

4.1: FCH2 – Local workshops¹⁸

The Fuel Cell and Hydrogen (FCH) JU has committed to working with regions in order to facilitate market introduction. This commitment to regions has produced a lot of information and a final report that includes:

- Analysis of the business cases for fuel cell and hydrogen applications that local authorities are seeking
- Assessment of the overall set of potential projects to be implemented by regional and municipal authorities, adding up to over EUR 1.8 billion over the next 5 years
- Identification of existing funding sources for future project implementation.

To date, 91 Regions and cities willing to participate in the activities have signed a MoU. One of the main activities has been the local workshops that promoted the exchange of knowledge on best practices in FCH project development and discussions on the best way for European cities and regions to implement FCH projects.

4.2: Vanguard initiative and BBI¹⁹

The industrial partner of the BBI JU, the Bio-based Industries Consortium (BIC) has signed a Memorandum of Understanding (MoU) with the Vanguard Initiative. The Vanguard Initiative was established in 2014 as a network of EU regions and facilitates the creation of trans-regional demonstration projects. Activities under the collective MoU include:

- Awareness raising activities on BIC and the Bioeconomy Pilot being implemented by the Vanguard Initiative;
- Improving access and strengthening synergies between different financing instruments;
- Connect actors across regions and sectors along new value chains.

4.3: FCH Funding and Financing Navigation Tool²⁰

Many potential beneficiaries have difficulties to access the appropriate funding when attempting to utilise more than one source of funds. In order to facilitate what they call the 'blending of funds', FCH has developed a 'Funding and Financing Navigation Tool', which is an output of the FCH Cities and Regions Initiative.

In the initial section called the 'Cockpit' different filters can be applied such as: Country and/or Region, Type of beneficiary, Budget range, and Requirements for co-funding.

A list of appropriate funding programmes is generated, including a fact sheet for each programme with summarised information about the programme features.

¹⁸ Further information is available at: <https://www.fch.europa.eu/event/local-workshops-fch-ju-regions-cities-initiative>.

¹⁹ Details available at: <https://biconsortium.eu/news/bic-and-vanguard-initiative-sign-bioeconomy-mou>.

²⁰ The tool can be found at: <https://www.fch.europa.eu/page/combining-funds>.

4.2 Barriers and bottlenecks in collaboration

This section summarises barriers and bottlenecks to developing collaboration mechanisms between public managing authorities and JUs. We consider issues in four categories: issues related to the structure and objectives of specific JUs; territorial specificities; issues related to the involvement of SMEs; and alignment problems related to differences in rules and timing. In some instances critical success factors can be identified that can help overcome the outlined barriers and bottlenecks.

4.2.1 Structure and objectives of specific JUs

The differences in governance, structures, sectors and objectives across JUs might be influencing how they establish collaborations with regions and promote synergies with ESI funds, some of them finding the multi-level coordination between EU and national/regional levels more challenging. The following issues have been identified as important:

- *Research projects at low TRL scale* – Among JUs there are some with the objective of forming large collaborative projects on the pre-competitive side at low Technology Readiness Levels (TRL)²¹. Such large projects are difficult to coordinate at the national level and would be even more so at the regional level. Research projects of this nature tend to involve many different EU regions and different types of stakeholders (SMEs, academia, patients, developers, etc) at low TRL scale.
- *Regionally specific vs open competition*- The way in which JUs pursue their collaboration with regions within funded calls can either contribute to specialisation of regional stakeholders or maintain competition between territories. The balance between both objectives depends on the JU. Even if the JU's mission and objectives are widely targeting all EU member states, JUs can contribute to streamlining the competition between regions. Differences emerge on the JU practices. Some seek to collaborate with a limited number of selected regions and MSs, while others leave collaboration open to any interested region. As an example, some JUs fund only one consortium, although some of the proposals are kept in the reserve list awarded with the "synergy label" (to be funded partly or totally by ESI Funds) while not competing with the winning bid (e.g. with alternative technology). In other cases, JUs seek to support a wider number of regions without being regionally specific. In either case, a clear mapping of the S3 priorities matching JU supported areas could be an interesting exercise, as well as identifying potential targeted regions/MS for synergies with a good match in certain JU funding topics of interest.
- *Size of funded consortia* - There are important differences in the size of funded projects under the JU calls. In some cases consortia are quite large and pan-European, selecting the public and SME participants before being joined by the large private sector participants. In such cases the size of consortia composed of multiple stakeholders working on common developments means it can be difficult to fund through ESI Funds one aspect of the project for one participant from a particular region, as the work is so interconnected.
- *Need for balanced territorial spread* - In the case of some JUs, their mandate is a balanced implementation of their activities across EU member states under specific EU framework regulations. In such cases, the pan-European dimension makes it difficult to establish collaboration with specific regions or national authorities on an

²¹ Technology Readiness Scale used by the European Commission under Horizon 2020: https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-q-trl_en.pdf

individual basis. However, even in such cases there is an interest to establish collaborations with some local infrastructures (such as regional airports in the case of SESAR).

4.2.2 Territorial specificities

Among the territory-specific bottlenecks for collaboration with JUs, the following were identified:

- *Wide national/regional priorities*: Specialisation areas under S3 are often too wide to be really meaningful. Moreover, when implementing S3, many Member States and regions are launching non thematic calls, leading to competition between different priority areas within the same territory;
- *Lack of reciprocal knowledge on research agendas*: In many cases the regional authorities lack the knowledge about the JU. Therefore, at a more strategic level the coordination between the JUs and regions would be facilitated if there were a mechanism to share information in an efficient way on the research topics relevant to JUs. Some JUs do have such mechanisms, such as events or publications where regional authorities can make a pitch highlighting the competencies within the region;
- *Insufficient mapping of regional capacities*: regions may not be aware of activities relevant to one or more of the JUs being undertaken in their region, despite the development of S3 that should have, through the EDP, strengthened the understanding regarding the regional capacities;
- *Lack of critical mass*: There are also certain barriers and bottlenecks that arise due to the characteristics of the region. One of these is the particular problem of more rural areas being under-represented, mainly because of a lack of critical mass, although some of the sectors targeted by JUs are among their S3 priority areas;
- *Lack of international networks*: A major issue for some regions is that institutions within the region have little experience in establishing interregional and international cooperation and networks. This means they do not have the appropriate international partners required for building a consortium;
- *Lack of intra-regional coordination*: Furthermore, within the region undertaking correcting measures may be hampered by the problem that the same entity within the region does not deal with ESI Funds and S3 and with the thematic area covered by a certain JU. For example, in the case of FCH2 JU, mainly the thematic regional entities (e.g. a regional energy agency of department) are involved in collaboration with the JU, and the link to the ESI Funds' Managing Authority is often missing, leading to missed opportunities in creating funding synergies.

4.2.3 Issues related to SME involvement

The issues related to business participation focus on the balance between large enterprises and SMEs. In particular the following bottlenecks were identified that hinder a balanced representation:

- *Lack of information* - For many SMEs, the participation in JUs and more generally the funding ecosystem remains abstract. SMEs are often not informed of the various options for funding to support their development;
- *Lack of knowledge, resources and capacities* - SMEs are in most of cases too small to be visible from outside and attract other stakeholders to engage in collaboration. Large Enterprises have the knowledge and capacities to participate, whereas SMEs have low resources and often do not see the value of putting time into EU projects.
- *Constraints of IP policies*, not allowing the flexibility to allow negotiations on exclusive rights.

4.2.4 Alignment problems

Many of the obstacles encountered are reminiscent of those that have been described elsewhere in relation to the combination of funds (Ozbolat and Harrap, 2018)²². Such issues are based on the differences between the funding sources with respect to rules and reimbursement procedures. In particular, the following obstacles seem relevant for collaboration with JUs:

- *Differences in funding rates, eligible costs and timeframe*: Issues include the fact that the H2020 and ESI Funds have different rules with respect to funding rates and eligible costs, and the need to avoid double reimbursement of costs; this can affect the technical consistency when building complementary schemes and projects. Other implementation issues are related to the different management requirements (such as reporting on project progress) and the difference in the time of the calls and project start dates. Harmonisation of JU calls and regional or national calls is not obvious, but can be important, particularly for businesses with narrow time constraints;
- *Multiplicity of instruments*: There is a perception that too many instruments for R&I are in place, inhibiting a deeper understanding of the types of costs funded and partnerships or criteria that are applied. The beneficiaries of funds, particularly in regions that are promoting synergies at the programme level, highlight the need to rationalise the existing funding instruments at the European level;
- *State aid rules*: Another issue with respect to rules and regulations is related to the constraints imposed by the State aid framework. Support can be sought through cooperation and the exchange of expertise regarding the various ways to find solutions within the State aid Framework (General block exemption, de Minimis, Pre-notification to DG Competition);
- *Language issues*: A final point regarding different rules is that local ESI Funds' calls generally speaking are drafted in the local language, which can create extra effort for the JU when developing synergies.

²² See also the Joint Statements issued by S2E and national authorities: <http://s3platform.jrc.ec.europa.eu/national-events>

5 Increasing the collaboration potential between JUs and ESI Funds' Managing Authorities

The current collaborations between JUs and national/regional Managing Authorities have demonstrated a number of interesting practices, but represent to date a limited number of territories and a small budget. The examples, however, show the potential for scaling up current practices, both in terms of geographical spread and in terms of achieving critical mass. Possible ways forward include match-making initiatives, the organisation of targeted support, and the development of guidelines for public authorities and JUs to engage with each other. We also briefly look at opportunities beyond 2020.

5.1 Match-making initiatives

5.1.1 EU-wide match-making between JUs and Managing Authorities

In order to promote greater understanding about the potential for collaboration with JUs and the different modes that can be employed, a match-making event was organised by JRC in cooperation with DG REGIO, the European Parliament, the European Committee of the Regions (CoR), three JUs (Clean Sky 2 JU, FCH2 JU and BBI JU) and with a number of regional and national ESI Funds' managing authorities, in order to promote collaboration in support of S3 implementation. The event took place in the CoR on 7 March 2018, and gathered around 180 participants, including regional and national Managing Authorities (MAs) and around 35 EC staff from 6 different DGs. Half of the participating MAs was already collaborating with JUs, and the other half was interested in setting up collaborations (see Figure 1).

The principal objectives of the event were:

- To bring together JUs with relevant regional stakeholders from EU28 countries;
- To introduce stakeholder engagement methodologies to facilitate the exchange of practices and collaboration modes, with particular focus put on creating the synergies between funds, stakeholder engagement, etc.;
- To facilitate mutual learning to identify specific challenges for regions from EU15 and EU13 (with a special emphasis on barriers, obstacles, opportunities, areas for improvement etc.), identifying common bottlenecks for such collaborations;
- To exchange good practices for establishing and implementing such collaborations
- To boost matchmaking through round tables and thematic sessions to identify mutual fields of interest for networking.

The event was a pilot and therefore focused on selected themes/sectors covered by three of the existing JUs, namely Clean Sky 2 (CS2) JU, Biobased Industries (BBI) JU and Fuel Cells (FCH2) JU. Three parallel sessions were organised for each of the three JUs that presented their activities in the plenary. Key messages highlighted by speakers during the event include the following:

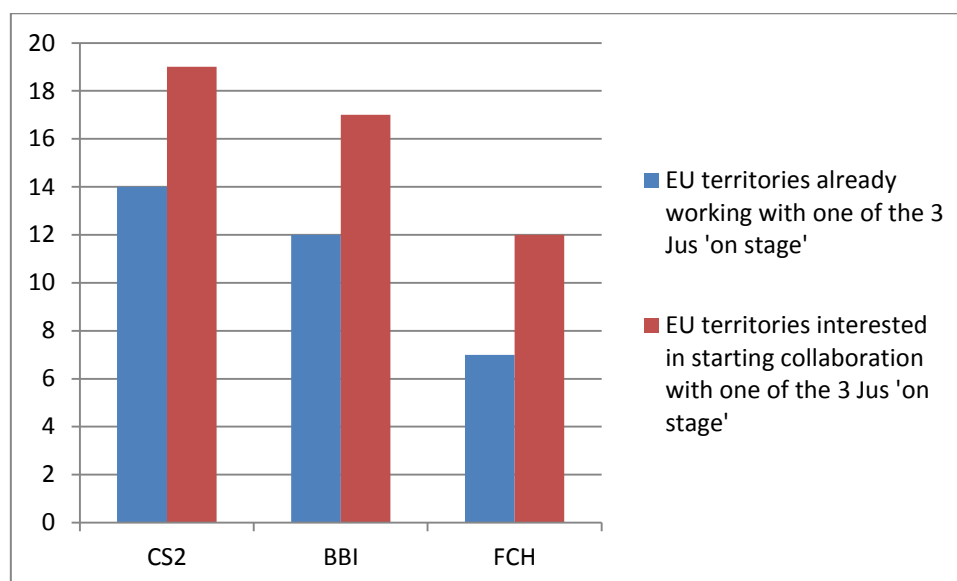
- Collaboration and exploitation of synergies between JUs and S3 are instrumental to match EU-level (top-down) and regional level (bottom-up) strategic priorities and identification of related investment projects;
- Regional partnerships are going to become increasingly important in achieving EU goals: it is important to build critical mass based on knowledge co-creation processes, with the involvement of industry and education and research institutions. In this sense, the public-private partnerships promoted through JU calls for proposals and the EDP processes and partnerships activated within S3s are mutually beneficial to enhance the impact of the different initiatives carried out within regions. As such, collaborations can contribute to the rationalisation of R&I instruments;
- It is important to make synergies perform better: e.g. by looking at concrete examples on how synergies can be created, and learning how to overcome certain

barriers. There is interest in Mutual Learning exercises so that regions can exchange views on how to promote synergies;

- Access to international networks may be as important as access to funding from JUs: regions can benefit from positioning their activities in international R&I agendas, connecting their SMEs to large enterprises and making their priorities more specific and market-oriented;
- Conducting regional analysis to identify capabilities can help to identify areas of cooperation and improve impact of S3 and of JUs.

The expectations of the regional authorities that took part at the event, shown in Figure 1, provide interesting insights to shape future collaborations.

Figure 1. Profile of participating public Managing Authorities (Source: JRC)



During the organisation of the event interests of the participating stakeholders were collected through the information provided in the registration form. The expectations of participants are summarised in the Box 5 below.

Box 5: Expectations on match-making by participants at the time of registration for the event (Managing Authorities, JUs, EC) (Source: JRC)

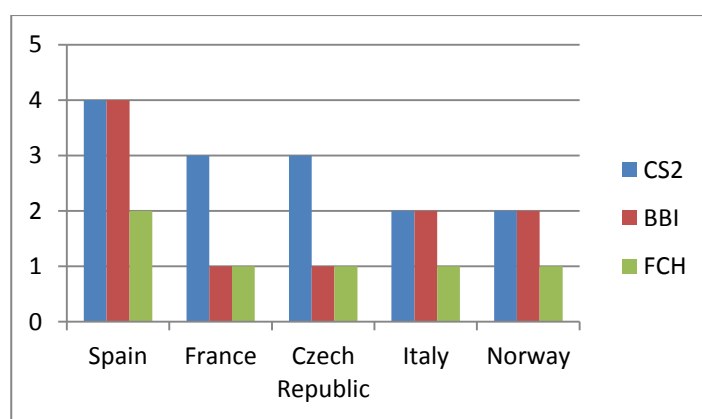
Expectations of participants in the match-making event of 7 March 2018

- How can JUs contribute to implementing S3 at national and regional level?
- Technical aspects of synergies: financial rules, stakeholder engagement and commitment, how to launch complementary regional calls, barriers, innovative models of collaborating
- How to increase collaboration between industry, public sector and the research community, PPPs?
- How to increase collaboration between small and big companies?
- Mutual learning between regions, between JUs
- Learn about synergies between JUs
- How to stimulate EU13 to enter into EU partnerships?
- What more could be achieved in the post-2020 period? What are the plans for synergies under Horizon Europe?
- How to start/intensify collaboration with JUs?
- How to inspire higher political level regarding set up of PPPs in the region?

5.1.2 Country-specific or theme-specific match-making

In view of the conclusions from the EU-wide match-making event, further progress on the collaboration practices through smaller match-making events can be considered in the future. A thematic focus centred around on particular JU can allow entering into more detail regarding topics for collaboration with targeted EU territories. Figure 1 indicates that there is a wide interest in each of the topics of the JUs presented at the Brussels match-making event. Theme specific match-making can also be considered in collaboration with interregional S3 partnerships under the Thematic Smart Specialisation Platforms²³.

Figure 2. Number of regions attending the Brussels match-making event and having expressed interest in setting up a collaboration for selected countries (Source: JRC)



Also geographically targeted actions could be considered in order to strengthen collaborations, particularly with respect to low capacity countries which are struggling to access Horizon 2020 networks, or in territories of particular interest to JUs but where the coverage with funded projects so far has been low. Figure 2 shows, for a few selected countries as illustration, the number of regions attending the Brussels match-making event that expressed interest in setting up a collaboration with the three JUs that were 'on stage' at the event. The graph suggests that there is a potential for organising national events involving a number of JUs as well as the interested regional and national authorities. From EU13 in particular 5 countries attending the match-making event showed interest in exploring collaboration with particular JUs.

²³ <http://s3platform.jrc.ec.europa.eu/s3-thematic-platforms>

5.2 Targeted support

JU collaborations are not evenly spread across the European territory. JUs report issues related to capacity of regional administrations, as well as related to general weaknesses in the regional innovation eco-system, in line with what are considered determinants of lower framework programme participation. Pontikakis et al, (2018) identify two major issues in this regard: 1) the level of international engagement of entities within the innovation eco-system and 2) the investment by the private sector in research and innovation activities and the capabilities of the firms to undertake such activities.

Some EU regions lack the experience in internationalisation and lack capacity to optimise their involvement in JUs. Targeted support to such territories can help MAs in such regions to better benefit from the opportunities JU offer in increasing international collaboration. This may include building the capacity within organisations to manage international projects or developing schemes to increase the international networking capacities within the region.

In terms of private sector investments in a territory, this may be indicative of a healthy research and innovation system. However, there may be specific actions that could be taken at a policy level to improve the research and innovation capabilities of firms leading to subsequent investment in such activities. As the JUs are partnerships involving industry, collaborating with them could be a means to understanding better the industry's requirements in the specific area of the JU and the policies that would be necessary to support investments.

Currently targeted support activities are developed by the RIS3 Support to Lagging Regions project²⁴, as well as by the Stairway to Excellence project, implemented by JRC in collaboration with DG REGIO and upon initiative of the European Parliament. Also technical assistance under ERDF can be used to support capacity building activities. Finally activities can also be deployed by particular JUs in supporting capacity in targeted territories of interest.

²⁴ <http://s3platform.jrc.ec.europa.eu/ris3-in-lagging-regions>

5.3 Developing guidelines

Based on current collaboration experiences this section suggests a set of guidelines for MAs and for JUs to initiate and upscale collaboration. The guidelines are not meant to be a blueprint but should be considered within the local context of each region and the thematic context of each JU. We consider specific guidelines for both JUs and Managing Authorities.

5.3.1 Guidelines for Managing Authorities

MAs can benefit from engaging in a deeper understanding of the JUs activities and explore how these match with the competencies in the territory. There is also a need to better understand the failures in the regional system that may be blocking participation in international competitive programmes and to understand how JUs can be used as a means to address these issues. In practice there are several elements that territories can consider when collaborating with JUs.

Develop a territorial outreach strategy towards JUs and towards other territories

An outreach strategy can help the region to clarify its position in a certain field, market this position to partners outside the region, and actively sell the benefits of collaborating with the region. Such a strategy can help build trust and openness towards stakeholders in and outside the region. It can be used to reach out to JUs, but also to other regions, and to other EU-wide initiatives (KICs, cPPPs, etc.). Gradually building trust in collaboration has also been flagged as an important aspect among existing collaborations. A strategy can reflect this aspect e.g. by starting off with small scale initiatives and gradually moving into more advanced types of collaboration. In building an outreach strategy, the following elements can be considered.

Optimising horizontal and vertical RIS3 governance coordination

Shaping the RIS3 governance in a way that horizontal and vertical multi-level coordination is fostered can support collaboration between those responsible for ESIF, for S3, for thematic policies and for general research and innovation policies at both national and regional level.

Analyse own capacities and thematic priorities

Increasing efforts in mapping the available capabilities in the territory and in the supply chains across European territories (e.g. through regional fiches) as well as an analysis of the territories' ambitions (priorities) can help in understanding how they match with capacities and ambitions of the different JUs.

In some cases the regional priorities may not directly match with the themes of particular JUs, but it can be worthy for regions to look into the details of the JUs' research agendas in order to identify potential matches at a detailed level of granularity. Also, some JUs have identified regions with capacities and initiatives relevant in their field, but which have not included a related thematic priority in their S3 strategy. For regions it is therefore important to also look beyond their current set of thematic priorities and to consider possible matches between their territorial capacities and the topics of the JUs.

Support actions facilitating internationalisation

Practical ways to support internationalisation can include the following:

- Organising regional actors around a focal point or a cluster can help in connecting the region easier to other regions, and to the JUs. In general, the involvement of SME clusters seems to be a good way of gathering the interest of larger numbers of companies in JU collaboration. Regions can also allocate funds for SMEs to provide complementary services to local partners that are already involved in a particular JU;
- The use of ambassadors (researchers, businesses etc.) on the ground in the region can help promote JUs, for issues related to thematic knowledge, but also in relation to the implementation phases such as the joint calls.
- The calls for proposals launched by the different JUs are usually addressed to consortia composed of a variety of members. Therefore it is important to get in touch with other regions and organisations that may have similar S3 priority areas.
- Access to international networks may be as important as access to funding from JUs. Regions can benefit from positioning their activities in international R&I agendas and from connecting their SMEs to large enterprises. An easy way to do this is to promote JU calls in the region's territory through workshops or roadshows in collaboration with the JU.
- Participating in interregional partnerships and seeking collaboration between the partnership and a JU is another way of fostering internationalisation in the territory.

Consider the role the territory wants to play in the collaboration

The following aspects can be considered:

- Check the region's ambition with respect to typology of actions that could be developed.
- Some of the regions could have more interest in those actions framed in the research area, while others may have some priorities in activities closer to deployment. Therefore, a self-analysis of the needs and priorities of the region is useful in order to identify the best options to collaborate with other partners.
- In line with this, identify the TRL scale of the projects funded by the different JUs
- JUs launch multiple calls for proposals. Each one of these calls is addressed to projects with different levels of technology readiness. Usually, JUs require that proposals should clearly state the starting TRL and the TRL that they intend to achieve at the end of the project.
- Consider the level of involvement in case of participating in a partnership (leader or follower)
- The region should take into account the role (leader or follower) that they would like to play when planning the participation in a partnership²⁵. Each one of the members will have different responsibilities and will develop a typology of tasks.

Consult JUs and their guidance notes

Several JUs have guidance notes²⁶ on synergies, templates for MoUs²⁷ and examples of collaborations²⁸ available online. Also direct contact with the JUs could facilitate the sharing of information and the identification of common interests and as a further step some alignment of research agendas could be envisaged. In addition, this would make possible closer and more open communication with NCPs and State representatives to

²⁵ FCH JU distinguishes between leader and follower cities in its large scale demonstration programme for fuel cell bus fleets in European cities (<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/fch-01-5-2017>).

²⁶ Guidance principles commissioned by BIC (the Bio-based Industries Consortium), private partner of BBI JU: https://biconsortium.eu/sites/biconsortium.eu/files/downloads/Guidelines_BBI-ESIF-Final.pdf

Cleansky2 guidance note: https://www.cleansky.eu/sites/default/files/inline-files/ESIF_Guidance_note_CSJU_17_07_15.pdf.

²⁷ Cleansky2 model for a Memorandum of Understanding: <https://www.cleansky.eu/memorandum-of-understanding-with-clean-sky-2>.

²⁸ Examples of FCH JU synergies: https://www.fch.europa.eu/sites/default/files/181123_FCHJU_Regions_Cities_Final_Report_FINAL.pdf.

have up-to-date communication on calls' results, with the projects that have been selected for funding. Timely information on projects can facilitate synergies with other activities promoted at the regional level.

5.3.2 Guidelines for Joint Undertakings

Develop an outreach strategy towards national and regional Managing Authorities

Similarly as for Managing Authorities, a strategic approach to outreach²⁹ can be helpful for Joint Undertakings, and set clear objectives for a given time horizon. An overview of possible collaboration modes for achieving those objectives has been presented above. The following elements can be considered in such strategic approach.

Exploring and mapping territorial, stakeholders, priorities and competencies matching JUs strategic agendas

From the side of the JU it is important to understand to a greater extent the priorities and competencies in different territories, in order to be able to better inform relevant MAs about the work of the JU.

One of the Instruments that could be useful to facilitate this analysis is [Eye@RIS3](#) by JRC. The Eye@RIS3 is an online database of S3 priorities. This tool offers information about public investment priorities for innovation by region across Europe. These priorities are classified by economic and scientific domains. There are also thematic platforms ([Agri-Food](#), [Energy](#) and [Industrial Modernisation](#)) aimed to foster interregional cooperation based on matching smart specialisation priorities related to these three areas.

In cooperation with JRC, the results of mapping exercises, data analysis and knowledge generated by different JRC research teams could be identified in the fields covered by JUs. Also contact details of relevant MAs can be useful.

Identification of territorial and EU wide research infrastructures

The mapping of excellent research infrastructures in JU related fields could be a helpful instrument as well. The S3 Thematic platforms are identifying and bringing forward research infrastructures at a regional scale, that can help upscaling and exploring the integration into value chains.

Other initiatives promoted by DG RTD, such as RISCAP website³⁰ or MERIL website³¹, could also be useful for mapping international and European research infrastructures. This exercise could be particularly valuable in the case of EU13 research infrastructures, which are investing ESI Funds in research infrastructures but sometimes lack the experience and resources to connect them to wider European networks.

Identify the regions/member states targeted for JUs for cooperation

Even if JU activities and calls for proposals are widely targeting all EU member states, a clearer communication of the JU strategy to connect and reinforce linkages with territorial capacities could provide orientation and help ESI Funds' managing authorities to activate the needed resources and tools for establishing synergies with JU activities.

²⁹ An example of an interesting outreach approach includes the KIC EIT RIS Strategies, in which EIT KICs define the level of ambition, three-year goals and main directions of action, as well as a roadmap in which countries of interest are identified (See https://eit.europa.eu/sites/default/files/eit_ris_guidance_note_2018-2020.pdf).

³⁰ <https://riscape.eu/mapping-international-research-infrastructures/>

³¹ <https://portal.meril.eu/meril/>

The results from mapping territorial capacities, projects and infrastructures in JU related fields could help in defining a more targeted strategy to connect funded projects under JU calls with S3 capacities.

In addition it is very important to involve several territorial contact points, including those responsible for ERDF, those managing the RIS3 and those responsible for thematic policies (ministries or agencies).

In doing so, also networks of National Contact Points can be used to disseminate the opportunities for collaboration offered by JUs. Examples are HEALTH-NCP-NET, BioHorizon and NCP_WIDE.NET.

Offer specific facilities and services for regional partners

JUs can consider performing an evaluation of proposal from a regional call, or share the reserve list of top rated projects from a JU call with regional beneficiaries (if regions can fund mono-beneficiaries).

Promote actions for increased SME participation:

JUs can consider the development of challenge driven research, by splitting big projects in different smaller parts, so as to share responsibilities in different phases and to avoid involvement from all SMEs from the start. The sharing of market challenges between big companies and SMEs can also gain SMEs' trust in getting involved, and their interest in research projects with clear opportunities for future business. Also the support from JUs to build local clusters can help create more local critical mass. In some cases a cluster can also become a partner of a JU.

Targeted guidance material and dedicated sections under JU call for proposals

The availability of specific guidance material for regional authorities willing to establish synergies with JUs could facilitate a more proactive approach and exploratory contacts with JUs. The practice of some JUs to include a dedicated section under their website has proved to have very good results and is a practice from which other JUs could learn.

In addition, the inclusion of specific references and a dedicated section under the proposal definition to be filled by the beneficiaries of ESI Funds applying to JUs call for proposals is a clear way of connecting JU funded projects with planned activities at the regional level, making a clear distinction and avoiding overlap or double funding of activities. An interesting example of fostering project level collaboration is also represented by the local workshops organised by FCH JU on promoting the exchange of knowledge on best practices in FCH project development (See box 4).

Collaboration between JUs

Furthermore, there is scope for better information exchange between the JUs so as to not duplicate common work. In some circumstances the scope for shared working methods and calls could be explored so as to rationalise the plethora of different instruments available.

5.4 Beyond 2020

The original rationale of the European Commission to launch JUs is still relevant, with under-investment of the private sector in R&I, uneven competitiveness across EU member states and a strong global competition in R&I. The recent evaluation of the different JUs (European Commission, 2017) has shown that they have been able to address strategic technologies in sectors aligned to the European knowledge based economy, but addressing challenges regarding the alignment of their activities with relevant regional and national policy initiatives such as Smart Specialisation Strategies needs reinforcement.

The European industry association and the European Association of Research and Technology Organisations (EARTO) have recognised (EARTO, 2017) that JUs are unique platforms, which foster cooperation between public and private actors by pooling their diverse capabilities and creating the critical mass for innovative breakthroughs. They also leverage the necessary funds for large-scale European projects, through good understanding of channels for upscaling and marketability of products, bridging gaps, accelerating results and increasing impact of R&I programmes. The number of JUs is still increasing, with the European High-Performance Computing Joint Undertaking (EuroHPC JU)³² having started operating in November 2018. The aim of this JU is to pool European resources to develop top-of-the-range exascale supercomputers for processing big data.

The proposal of the European Commission for the next Multi-annual Financial Framework 2021-2027 (European Commission, 2018) includes clear encouragement for synergies between Structural Investment Funds and other EU programmes, particularly the InvestEU fund³³ and Horizon Europe. The proposal that still needs to be approved by the European Parliament and the Council, introduces important novelties to bridge the different rules applied to centrally managed programmes and ESI Funds. Among them, Member States on a voluntary basis will be able to transfer 5% of ESI Funds to any other EU instrument to fund a project in which case the rules of the other instrument would apply. This includes the possibility of transferring ESI Funds money to Joint Undertakings, to be managed under the rules and criteria applied by them. This novelty opens an important door for regions and Member States managing ESI Funds to have a closer collaboration with JUs and to invest ESI Funds in scientific research areas under their S3 and in line with JU priority areas that are important with respect to the future of the industrial innovation in key domains for the European Union. This possibility can help certain regions to strengthen their international networks, position themselves within the context of EU funded projects that may open the door to other partnerships and to integrate industry in the S3 process.

The collaboration mechanisms put in place so far by the seven JUs with regional and national public authorities constitute a step towards reinforcing the alignment with other existing initiatives and increasing the complementarity of the activities carried out in their work programmes. However, the degree of engagement established varies greatly across JUs and the results yielded are still uneven and in some cases without clear results. The implementation of Smart Specialisation Strategies could greatly benefit from the synergies of funding that these collaboration mechanisms have established, but more importantly from the leverage effect that coordinated efforts of aligned policy objectives could have.

In this sense, the preparation of the next programming period opens the opportunity for the stakeholders involved in building JUs' collaborations with Member States and regions to consider how to address some of the current challenges, and to jointly build trust in collaborating. The experience gained during this programming period can also feed into

³² <https://eurohpc-ju.europa.eu/index.html>.

³³ https://europa.eu/investeu/home_en

the continuing discussions on the future Horizon Europe and multi-annual financial framework.

6 Conclusions

As shown in this report, current collaboration practices between Joint Undertakings (JUs) and national and regional ESI Funds' managing authorities are diverse in nature, and cover a wide range of thematic areas and EU territories. While some JUs and public authorities are quite experienced in collaborating, for others the opportunity exists for upscaling and extending current practices across JUs and across EU territories. Through mapping the current state-of-play, this publication aims to support mutual learning across all actors involved, in view of contributing to unlocking the existing collaboration potential, and to increasing efficiency of R&I spending.

In addition, a number of elements, addressed in this report, can contribute further to this objective, including a strategic approach to outreach and match-making by all actors involved, further experimentation and learning about collaboration practices and related bottlenecks, as well as targeted support for those actors lacking capacity to engage in collaboration. Furthermore, the possibility after 2020 (in the proposal for common provision regulations³⁴) for Member States and regions to request a transfer up to 5% of the programme financial allocations to another EU fund (for example a JU), becomes more realistic when partners can build on prior experience in collaboration and gradually build up mutual trust between partners.

Finally, in the context of further improving efficiency of R&I spending, similar practices can be analysed and disseminated for collaborations between ESI Funds' Managing Authorities and other European Partnerships. This can cover the full spectrum of such partnerships, public-private (PPP) or public-to-public (P2P).

³⁴ Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, and the European Maritime and Fisheries Fund and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund and the Border Management and Visa Instrument https://eur-lex.europa.eu/resource.html?uri=cellar:26b02a36-6376-11e8-ab9c-01aa75ed71a1.0003.02/DOC_1&format=PDF.

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List of abbreviations and definitions

ATM	Air Traffic Management
BBI	Bio-based Industries
BIC	Bio-based Industries Consortium
CS	Clean Sky
EC	European Commission
ECSEL	Electronic Components and Systems for European Leadership
EDP	Entrepreneurial Discovery Process
EIB	European Investment Bank
ESI Funds	European Structural and Investment Funds
FCH	Fuel Cells and Hydrogen
FP	Framework Programme
FP7	Framework Programme 7
H2020	Horizon 2020
IMI	Innovative Medicines Initiative
JTI	Joint Technology Initiative
JU	Joint Undertaking
MA	Managing Authority
MoU	Memorandum of Understanding
MS	Member State
R&D	Research and Development
R&I	Research and Innovation
S2E	Stairway to Excellence
S2R	Shift2Rail
S3	Smart Specialisation Strategies
SESAR	Single European Sky ATM Research
SIRA	Strategic Innovation and Research Agenda
SME	Small and Medium Sized Enterprises
SRA	Strategic Research Agenda
SRG	States Representatives Group
TRL	Technology Readiness Level

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Annex I. Joint Undertakings interview questions

I - Type of projects funded

What type of Technology readiness levels (TRL) scales are funded by JU calls (based on H2020 TRL scale)?

II - Structure of networks

How are the types of participants distributed within the different projects (For example, are there more REC in RIA projects than DEMO)?

1 - Cooperation mechanisms with regions

- Is there a concrete Action Plan for synergies – to engage with regions and utilise different sources of funds? If not, is there one envisaged?
- Does the JU have different levels of engagement mechanisms with regions (MoU, agreements, collaborations, other type)
- Are there selection criteria for which regions to sign a MoU with or undertake other types of collaboration?
- Which are the activities funded under ESI Funds? What kind of complementarity is envisaged between JU calls funded activities and complementary activities associated with ESI Funds?
- Do you have criteria for the selection of the complementary activities to undertake with regions in order to bring more added-value to project activities? These could include?
 - Enhancing local capacity & skills
 - Increase TRL or R&I activities
 - Support with infrastructures, equipment, labs, etc.
 - Other

2. Call for proposals

- Does the JU call for proposals include the possibility of introducing complementary activities funded by ESI Funds?
- What is the procedure that beneficiaries have to follow to include complementary activities (ESI Funds WP)?
 - Complementary activities included at the proposal stage?
 - Possible to undertake such activities once the project has started?
- Do they need to contact their MA for approval and at what stage of the process? What procedures need to be followed to undertake the complementary activities?
- Is there a synergy label provided to proposals positively evaluated on Synergies WP? If there is one, how do MAs treat the synergy label- prioritisation of ESI Funds proposals, additional points, direct funding, and additional evaluation?
- Does the JU provide guidance for beneficiaries on how to implement synergies in practice?

3 - Themes covered by JU

- How are the themes decided upon?

- Are regional actors able to influence the decisions on the thematic selection?

3 - Governance system

- Does the JU regional engagement take place through the MAs or with the regional stakeholders (institutions, business, research centres etc)?
- Is there a specific person in charge of this managing the cooperation, both in JU Secretariat and MA level?
- Is information shared between the JU and ESI Funds' MA regarding approved proposals? Proposal evaluation summary reports? Other? (ie. JU call for proposals results)
- How do final beneficiaries access the information regarding synergies? Is there a specific section on the JU website?

4 - Territorial approach

- Is the alignment with S3 priorities and contribution to S3 considered in the evaluation of proposals?
- How are new potential regions for MoU/agreements signature selected? Is there an identification of potential regions that could be targeted? How are these regions selected? Are their S3 priority areas considered?

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