



European
Commission

PERFORMANCE OF EUROPEAN PARTNERSHIPS

BIENNIAL
MONITORING
REPORT 2022
ON PARTNERSHIPS
IN HORIZON EUROPE

2. Contribution of European Partnerships

Research and
Innovation





2. CONTRIBUTION OF EUROPEAN PARTNERSHIPS

HIGHLIGHTS OF THIS CHAPTER

THIS CHAPTER ADDRESSES THE FOLLOWING QUESTIONS

What are the relevant benchmarks or points of reference to which the achievements of Horizon Europe partnerships can be compared? [Ch 2.1]

What is the contribution of European Partnerships to major European objectives – digital transition, green transition, and resilience? [Ch 2.2]

How can the contribution of European Partnerships to major Horizon Europe objectives – Key Impact Pathways – be monitored? [Ch 0]

What is the contribution of European Partnerships to the specific objectives set for the partnership instrument – additionality, directionality, transparency, openness, coherence, and synergies? [Ch 2.4]

How can the added value of European Partnerships be monitored? [Ch 2.5]

Because Horizon Europe partnerships have been launched only recently, and the Horizon Europe project-monitoring system is not fully functional, data regarding the performance and impact of Horizon Europe partnerships is very limited. Thus, this chapter is based partially on data collected from the officially launched Horizon Europe partnerships and partially on available data on H2020 partnerships, complemented with references to a limited number of relevant analyses and evaluation reports.

This report covers all 37 European Partnerships officially launched at the time of the report's publication. The number of Horizon Europe partnerships is expected to reach 49 by the time all currently planned partnerships have been officially launched.

A number of relevant benchmarks/reference points can be defined for Horizon Europe partnerships based on the data available on H2020 partnerships.

Horizon Europe partnerships are major contributors to both the digital and green transition, resilience, and the UN Sustainable Development Goals. The share of resources planned to contribute to these objectives is significantly higher in Horizon Europe than in H2020.

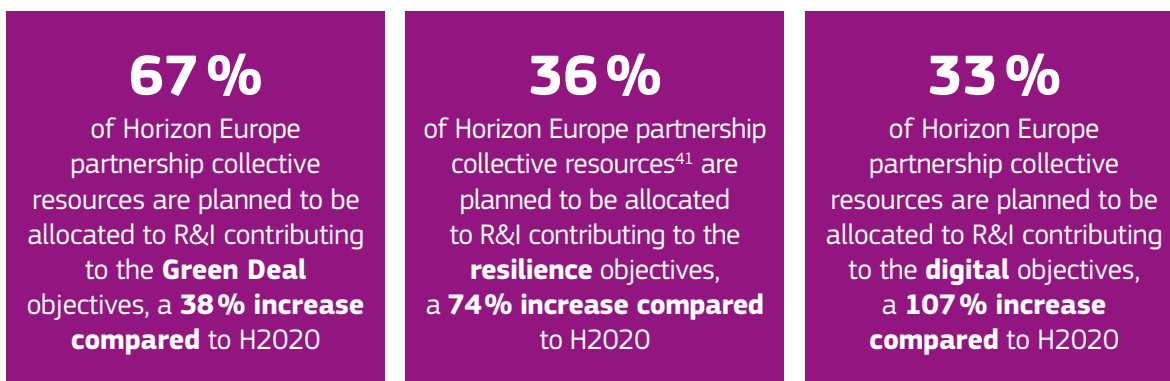
The Cluster Specific Impact Pathways developed in this report provide a framework and basis that may enable further analysis and insight into the combined impacts of the partnership portfolio.

The KPIs defined by the Horizon Europe partnerships are well aligned with the KIPs defined for Horizon Europe. While further alignment efforts may prove appropriate and beneficial in the future, the proposed selection of indicators based on Horizon Europe project-monitoring data can provide complementary insights into the performance and impact of partnerships.

The data and anecdotal evidence collected from the officially launched Horizon Europe partnerships gives an early indication of the intended performance of the partnership instrument and its role in enhancing additionality, directionality, transparency, openness, coherence, and synergies of European R&I activity.

Relevant European Commission evaluation reports, ERA-LEARN policy briefs on impacts of H2020 partnerships and anecdotal evidence collected in the ERA-LEARN country reports and Horizon Europe Partnership Fiches (Chapter 4) and Country Fiches (Chapter 3) indicate the greater strategic importance of the partnership instrument and thereby an increased potential to produce European added value.

SELECTED KEY FIGURES



2.1 SETTING BENCHMARKS BASED ON HORIZON 2020 PARTNERSHIPS

The purpose of this subchapter is to discuss the importance of establishing proper starting points (benchmarks) to facilitate the monitoring of partnerships, and how these starting points can be established initially by using Horizon 2020 data, and later starting points set by the Horizon Europe partnerships.

Since the data needed to define benchmarks is currently largely missing in Horizon Europe, the only viable option is to use H2020 partnership data in this first BMR. The second BMR will revisit this issue making use of starting points defined by the Horizon Europe partnerships for the purpose of demonstrating their progress and achievements.

The new partnerships (co-funded, co-programmed and institutionalised) are arguably different from their predecessors in many ways, including structure and organisation, scope, duration and ambition. However, certain factors, like the level of commitment from participating states, remain important, and research outputs, such as publications and IPR applications, are still included among the new partnerships' key output indicators.

At the same time, certain monitoring indicators, like the number of proposals received and projects granted, remain relevant, although they must be treated with caution as they depend on the number and frequency of calls as well as the size of the projects under the new partnerships. Nevertheless, bearing in mind these considerations, a benchmark can be set based on the performance of the corresponding partnerships under Horizon 2020⁴⁰.

The relevant set of benchmarks based on the available partnership data from H2020 is presented in Table 2. Each benchmark is discussed in more detail in the following sections of this chapter.⁴¹

40) Resources can contribute to several objectives at the same time, resulting in a total exceeding 100%.

41) The Horizon 2020 Partnerships considered include: 99 P2P Partnerships; P2Ps include ERA-NET Cofunds, EJPs, Art. 185 initiatives and JPIs); 6 EIT KICs (Climate, Digital, Food, Health, InnoEnergy, Raw Materials); 8 JUs (BBI, ECSEL, EuroHPC, SC2, FCH, IMI 2, SESAR, Shift2Rail); and 10 cPPPs (FoF, EeB, EGVI, SPIRE, Photonics, Robotics, HPC, 5G, Cybersecurity, Big Data Value).



TABLE 2. Benchmarks based on available partnership data during H2020

Actual contributions from MS/AC (P2Ps considered only)	EUR 2 227 214 791.39 ⁴³
Number of proposals	4 761 (JUs); 2 645 (cPPPs); 280 677 (other H2020)
Number of projects	2748 (EIT KAVA); 1 320 (JUs); 405 (cPPPs); 3 793 (P2Ps); 33 962 (other H2020)
Success rates	28% (JUs); 15% (cPPPs); 12% (other H2020)
Publications	78 (EIT KICs); 6 819 (JUs); 2 807 (cPPPs)
IPR applications	64 (EIT KICs); 240 (JUs); 13 (cPPPs)
Private for-profit companies' participation	26.12% (EIT KICs); 14.91% (P2Ps); 57.25% (JUs); 54.09% (cPPPs); 35.41% (other H2020)

Source: ERA-LEARN database for P2Ps (cut-off date June 2021); eCORDA for EIT KAVA, JUs, cPPPs, other H2020 projects (RIAs, CSAs, etc.) EIT KAVA: KIC Added Value Activities.

2.1.1 LEVEL OF CONTRIBUTIONS FROM MEMBER STATES AND ASSOCIATED COUNTRIES

In Horizon 2020, together with the EU, the Member States and Associated Countries participated actively in defining and funding, the programmes of ERA-NETs, Article 185 initiatives, EJPs and JPIs – i.e. the so-called P2Ps as well as the European High Performance Computing (EuroHPC) and Electronic Components and Systems for European Leadership (ECSEL) JUs. Based on ERA-LEARN data, which only covers P2Ps, the actual contributions⁴³ made by the Member States and Associated Countries⁴⁴ participating in the P2P partnerships reached more than EUR 2.2 billion⁴⁶.

2.1.2 THEMATIC DISTRIBUTION OF FUNDING

Based on ERA-LEARN and eCORDA data (Table 3), Horizon 2020 partnerships provided around EUR 10 billion of project funding⁴⁵. This is distributed as follows: around EUR 1.58 billion⁴⁶ as national contributions in P2Ps, EUR 5.74 billion for JUs and EUR 2.43 billion for cPPPs.

42) This figure does not include any other types of national contributions beyond grants to joint research projects, such as the contributions made by participating states to clinical trials under EDCTP 2.

43) By actual contributions, we refer to the funding given by each country to cover the participation of national science and technology groups in the funded projects of the joint transnational calls launched by the P2Ps.

44) The 27 Member States are considered plus Iceland and Norway from the Associated Countries.

45) This amount is larger in reality as only the national contributions are considered for P2P projects, excluding the EU contribution.

46) This figure is less than the EUR 2.2 billion figure mentioned in Table 2 because not all funds were categorised thematically

TABLE 3. Funding of thematic priorities under the different H2020 instruments (in EUR million)

THEMATIC PRIORITIES	P2Ps PROJECTS	JUs PROJECTS	cPPPs PROJECTS	OTHER H2020 PR
Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, Biotechnology	143.70	79.57	91.98	3 355.48
Climate action, environment, resource efficiency and raw materials	280.30	10.93	96.11	2 179.37
Europe in a changing world - inclusive, innovative and reflective Societies (incl. secure societies - cPPPs)	49.64		206.86	2 172.30
Food security, sustainable agriculture and forestry, marine and maritime and inland water research	285.81	686.81		2 158.10
Future and Emerging Technologies	43.22		49.16	2 003.42
Health, demographic change and wellbeing	599.53	1 006.15		4 694.03
Information and Communication Technologies		1 184.96	1 905.42	5 015.79
Secure, clean and efficient energy	101.24	296.71	84.91	4 085.47
Smart, green and integrated transport	80.24	2 472.90		4 919.32
TOTALS	1 583.69	5 738.30	2 434.44	30 583.29

Source: ERA-LEARN database (cut-off date June 2021) based on actual national contributions for P2Ps; eCORDA based on net EU contribution. Share of specific instrument investments in the specific theme in the total investments under the specific instrument (P2Ps, JUs, cPPPs and other H2020 projects, i.e. CSAs, RIAs, IAs, etc.). Only thematic priorities common across the different H2020 instruments are considered. Totals for 27 Member States, Iceland and Norway.

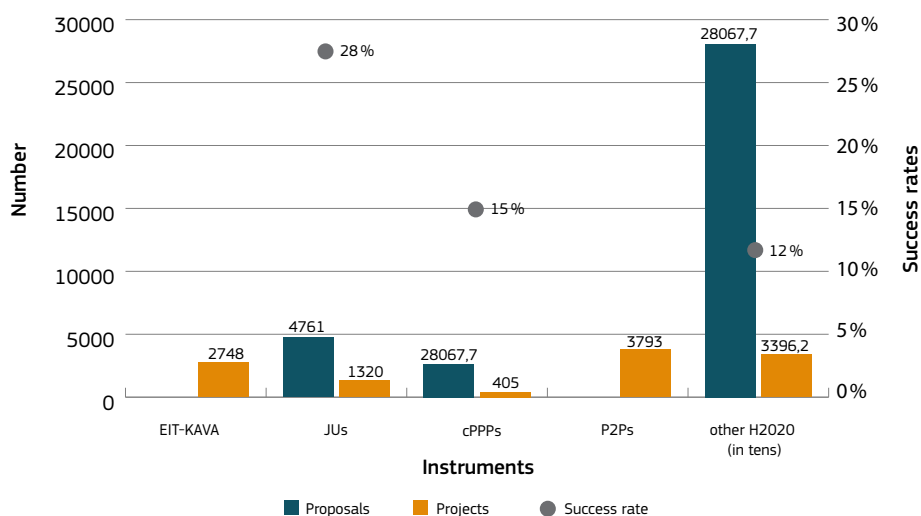
The thematic focus of the different types of Horizon 2020 partnerships varied. P2Ps funding was mainly concentrated in the areas of health, food security and agriculture and climate action. cPPP funding was allocated mainly to research related to ICT and Europe in a changing world topics. On the other hand, JU funding was mainly dedicated to transport and ICT as well as health-related research, which largely reflects the areas that also attracted most projects in the other Horizon 2020 instruments (i.e. CSAs, RIAs, IAs, etc.).

2.1.3 NUMBER OF PROPOSALS, PROJECTS AND SUCCESS RATES

Whereas the JUs are comparable to the cPPPs in terms of the number of proposals they attracted, the JUs present a far larger success rate than the cPPPs and when compared to the rest of the H2020 instruments (i.e. CSAs, RIA, IAs, etc.). Unfortunately, the missing data on the proposals submitted to P2Ps does not allow for an estimation of the success rate in these partnerships. Yet it is interesting to see that the P2Ps have supported a larger number of projects than the other partnerships. This can possibly be explained by the smaller size of the projects in P2Ps compared to those of JUs and cPPPs, although P2Ps projects are not homogeneous in size.



FIGURE 9. Proposals, projects and success rates of P2Ps, JUs, cPPPs and other H2020 modalities



Source: ERA-LEARN database for P2Ps (cut-off date June 2021); eCORDA for EIT-KAVA, JUs, cPPPs, other H2020 projects (RIAs, CSAs, etc.). EIT KAVA: KIC Added Value Activities; Proposal data for EIT KAVA and P2Ps not available.

2.1.4 PROJECT OUTPUTS FROM H2020 PARTNERSHIPS

Based on the available eCORDA data, the projects supported by EIT KICs, JUs and cPPPs produced a total of 9704 publications and 317 IPR applications. The dominance of JUs in producing the majority of these research outputs is significant.

FIGURE 10. Project outputs from projects supported by EIT KICs, JUs and cPPPs

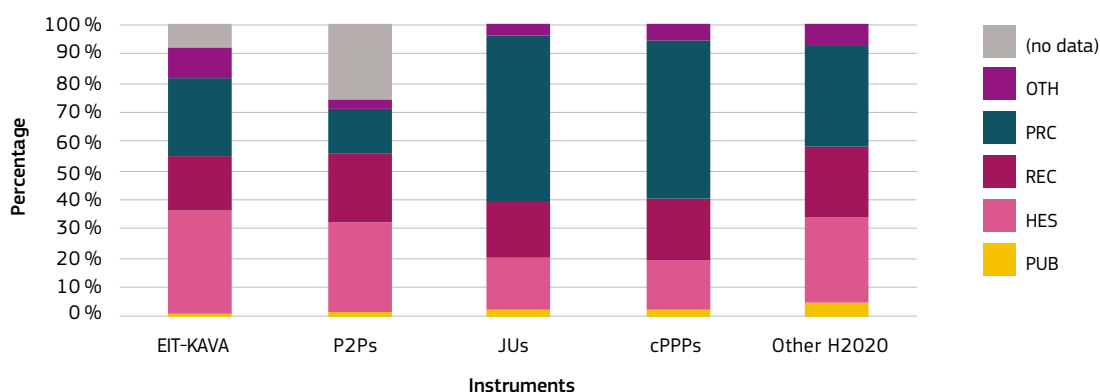
	EIT KICs projects	JUs projects	cPPPs projects
Publications	78	6819	2807
IPR applications	64	240	13

Source: eCORDA

2.1.5 PROJECT BENEFICIARIES IN H2020 PARTNERSHIPS

Partnerships differ as regards the beneficiary types they attract. EIT KICs and P2Ps, like the other H2020 instruments, address the full spectrum (higher education institutes, private for-profit companies, research organisations and, to a limited extent, public bodies), whereas projects supported by JUs and cPPPs are dominated by private for-profit entities.

FIGURE 11. Types of project beneficiaries in projects supported by EIT KICs, JU, and cPPPs



Source: ERA-LEARN database for P2Ps (cut-off date June 2021); eCORDA for EIT KAVA, JUs, cPPPs, other H2020 projects (RIAs, CSAs, etc.) EIT KAVA: KIC Added Value Activities; HES: higher education; OTH: other; PRC: private for-profit companies; PUB: public bodies; REC: research organisations. Totals for 27 Member States, Iceland and Norway.

2.2 CONTRIBUTION TO KEY EUROPEAN OBJECTIVES

The purpose of this subchapter is to give insights into the partnership portfolio's contribution to key European objectives at an aggregated level. This first report focuses on the EU's transitions towards the Green Deal and digital objectives, and support to a more resilient society, which constitute the major priorities of both the current Commission and the first Strategic Plan of Horizon Europe (2021-2024). For example, a hard target of 35% has been set in the Horizon Europe legal base for funding climate action⁴⁷. The same 35% target is expected in support of the digital transition⁴⁸. Resilience is a multidimensional and cross-cutting issue, so setting similar funding targets is not easy.

In this chapter, the analysis is based on a methodology that considers several elements obtained as input from the biennially updated partnership and country fiches, common indicators that are collected biennially, and biennially analysed Horizon Europe project-level data, to SRIAs, MoUs, Single Basic Act, studies, evaluations, etc. It will look particularly at the Partnership Specific Impact Pathways (PSIPs) and KPI tables (see Chapter 4) to understand how the partnerships intend to turn their expected results into useful innovations for European citizens and strengthen the ERA, and thereby contribute to the EU priorities of the green and digital transitions and resilience.

The analysis therefore draws on three main sources of data:

- strategy maps from the partnership fiches
- data collected through the partnership fiches on the main SDGs targeted (up to five)
- data collected through the Common Indicators Survey on indicator 3 Overall investments mobilised into EU priorities.

47) Art.7(10) Horizon Europe Regulation.

48) Funding for Digital | Shaping Europe's digital future (europa.eu)



Resilience was the most challenging priority to analyse. Health was chosen as the focus of the analysis of resilience because the COVID-19 pandemic was still active at the time these analyses were carried out. However, it is important to note that in the survey on the common indicators, where partnerships were asked to provide a self-assessment of the planned overall investments into activities linked to EU policy priorities, ‘resilience’ was interpreted in a broader way, encompassing health, societal and technological aspects (see Table 4).

The portfolio mapping carried out during the impact assessment of the institutionalised European Partnerships⁴⁹ showed the partnerships’ high relevance to the overarching EU priorities. This is also in line with the self-assessment by the European Partnerships during the Common Indicators Survey carried out in November 2021 (see Section 2.4.).

Approximately half of all resources are planned to be invested into activities linked to the European Green Deal priorities. Digital and resilience objectives were targeted by about one-sixth and one-fifth of all resources, respectively.

TABLE 4. Overall investments mobilised into EU priorities by European Partnerships

EU priority How much resources overall are invested into activities linked to the ...	Benchmark: [%] (H2020 predecessor or based on H2020 historic data)	Target: [%]⁵⁰ (whole duration of the Partnership)	Intended change: [%]
... Green Deal objectives?	49%	66%	+36%
... Digital objectives?	15%	31%	+109%
... Resilience objectives?	20%	34%	+72%

Overall=public and private; in-kind and financial

Source: Averages from EU Survey November 2021, Indicator #3 (see Chapter 2.4) (34 respondents out of 37 with response rates per question of 70-81%)

At the same time, the responses might be biased by current discussions on climate change and decarbonisation, which were more evident than discussions on digitalisation when the survey was carried out. The high level of the Green Deal starting point explains the lower intended increase compared to the other two priorities. European Partnerships plan to double their resources on digital objectives. Resilience objectives are also increasingly targeted. Overall, the European Partnerships plan to link the Green Deal objectives with the digital and resilience objectives, respectively. These aggregated characteristics are also reflected in the cluster and specific approaches of European Partnerships.

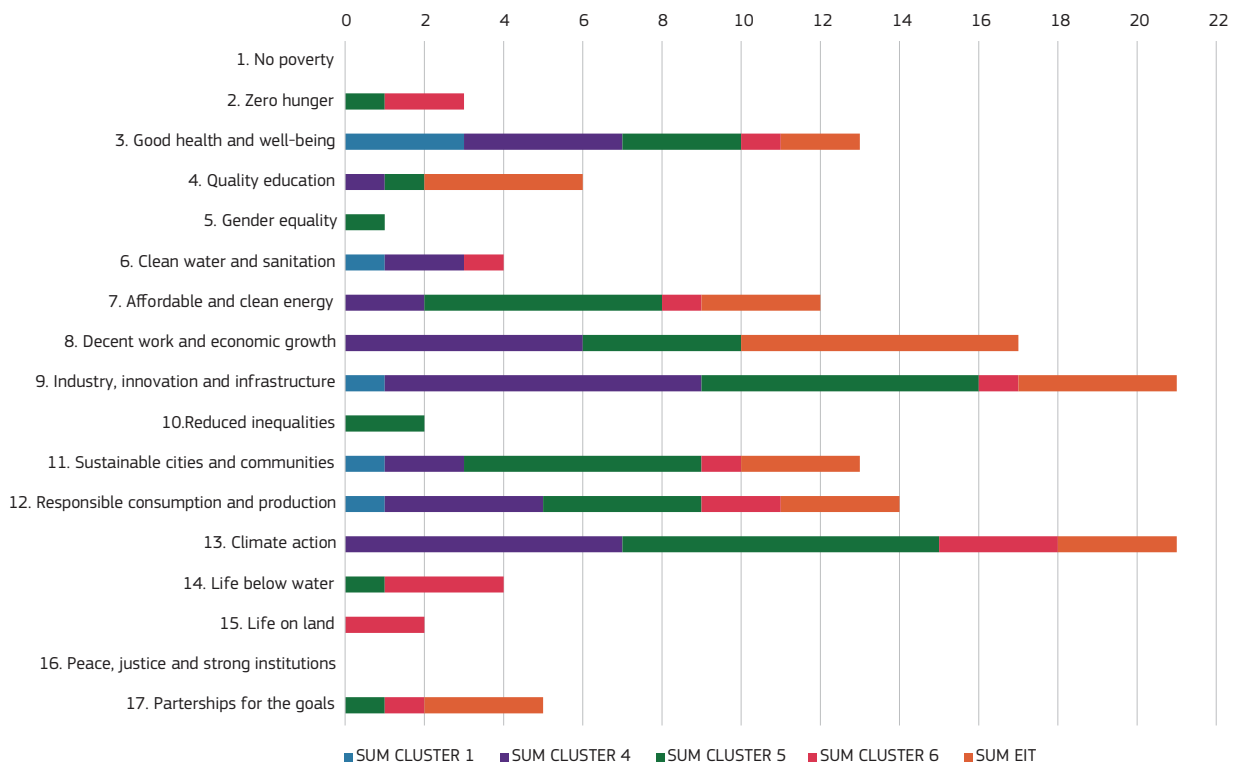
A core principle for the European Union is sustainable development and, therefore, this is a priority objective for the Horizon Europe Programme and partnerships. European Partnerships play a key role in tackling complex economic and societal challenges. In the fiches collected (see Chapter 4), each partnership has indicated the main SDGs it supports. Mapping the SDGs indicated by the partnerships illustrates the different aspects of expected contributions to EU priorities (Figure 12). In the following analysis, the SDGs are used in two ways: first, as widely accepted policy objectives, and second, as a proxy of partnerships’ engagement in EU policy priorities. The Key Impact Pathway 4 ‘Addressing EU priorities & global challenges through R&I’ will also monitor the projects’ contributions to EU priorities, including the SDGs, which in future may provide interesting insights to complement the current methodology.

49) European Commission, Directorate-General for Research and Innovation, Impact assessment for institutionalised European partnerships under Horizon Europe, Publications Office, 2021, <https://data.europa.eu/doi/10.2777/295096>

50) Percentages do not have to total 100. Resources may be linked to more than one EU priority.

The EU was instrumental in shaping the 2030 Agenda for Sustainable Development that has become the global blueprint. SDGs are an essential part of policymaking on internal and external actions across all sectors and partnerships. Over the years, an array of deeply transformative policies has been presented, highlighting the need for Europe to continue innovating and to remain at the cutting edge of global science. This will also strengthen Europe’s global competitiveness and enhance the EU’s international role – an important geopolitical perspective, in which emerging technologies have created a global innovation and scientific race. However, balancing openness and cooperation with strengthening global leadership and sovereignty in key sectors is crucial. European Partnerships have always been open to international collaboration as global challenges and strengthening competitiveness, especially in the climate and life-science domains, require joining forces beyond Europe.

FIGURE 12. Contribution of the European Partnerships to the SDGs



Source: Expert Group’s own analysis based on 35 Partnership fiches

Figure 12 indicates the biggest contributions from European Partnerships are to the following SDGs: #13 Climate action, #9 Industry, innovation and infrastructure, #8 Decent work and economic growth, #12 Responsible consumption and production, #11 Sustainable cities and communities, and #3 Good health and well-being.

Considering the expected concentration of efforts towards the three overarching policy priorities, further analysis of the aggregated contribution of the European Partnerships’ portfolio is called for. The focus of the analysis is on the allocation of resources, results, outputs, impacts, synergies, and leverages the partnerships are expected to create over time.

The analysis below will follow a cluster approach based on Horizon Europe clusters into which partnerships are assigned (clusters 1, 4, 5 and 6). The analysis will show if and how a group of partnerships contribute to selected EU policy priorities. Analysis across all clusters enables the identification of both possible and potential synergies between thematic orientations and individual clusters. Anecdotal evidence will be used to further illustrate synergies at the level of individual partnerships and between them.



The requirement for the Horizon Europe partnerships to define ex ante a clear logical framework of objectives together with a set of KPIs and resources to match these objectives has created a sound foundation for their better impact orientation. However, to address the complex and interconnected objectives of the twin green and digital transitions and resilience, partnerships must also act collectively at a strategic level and in line with SDGs and EU policies.

Therefore, the analysis will continue to draw on intervention logic for European Partnerships and build upon the rationales and objectives. It is proposed to use PSIPs for a more harmonised and, in some cases, a somewhat more detailed approach to intervention logic. The PSIPs show key linkages between resources, activities, outcomes, and impacts at the partnership level. The speed and extent to which the expected impacts and results will be obtained will depend on the scale of research efforts leveraged and the profile of partners involved and their commitments. In the analysis and with the existing PSIPs, Cluster Specific Impact Pathways (CSIPs) are further proposed to aggregate PSIPs data to enhance the strategic overview at the cluster level.

It must be understood that the development of CSIPs is still at an experimental stage and that they may well need to be further developed in future BMRs. Furthermore, the purpose of developing CSIPs for partnerships does not in any way undermine the importance of Partnership Specific Impact Pathways (PSIPs). On the contrary, CSIPs may develop into a functional tool only if the quality of PSIPs is sufficiently high. The objective for developing the CSIPs is twofold. First, by focusing on the pathways common to all partnerships belonging to a cluster, CSIPs inevitably highlight the specific characteristics of the thematic area, thereby providing further evidence for policymaking. Second, once the CSIPs have been further developed, in future they may be used to identify theme-specific indicators which are useful across all partnerships belonging to the same thematic cluster. This work could build on the Horizon Europe Destinations, which indicate the desired impacts for each cluster that the calls for proposals must address. Should these indicators prove useful for the partnerships, they may in future replace some of the existing partnership specific indicators and thereby enable further insight into the impact of clusters, i.e. joint impact of a thematic portfolio of partnerships. But it may be more difficult at the level of outcomes as partnerships have important specificities that risk being lost if only an aggregated approach is used.

Furthermore, the overall long-term objective of the analysis is to show the added value of partnerships, their specific contribution to policy priorities, and the importance of synergies between partnerships and clusters. The picture emerging from the analysis is that, when going beyond these methodology- and technology-oriented partnerships, there should be interconnections across the clusters. Clusters should not act in silos, but rather cross-fertilise each other to solve identified and complex grand challenges. Therefore, with the data collected it is possible to present links between partnership resources, actions, and results for individual partnerships as well as cross-partnership activities and within and between clusters.

The mapping and analysis of the European Partnerships' portfolio initially shows that they are equipped with the tools which are important to play a pivotal role in tackling the complex economic and societal challenges that constitute the EU priorities to create a stronger Europe in the world.

2.2.1 GREEN TRANSITION

Climate change and environmental degradation are an existential threat to both the EU and the world. To overcome these challenges, the European Green Deal is Europe's new growth strategy⁵¹ which aims to transform the Union into a modern, resource-efficient and competitive economy. The ambition of the European Green Deal is to make Europe climate neutral by 2050, boost the economy through green technology, create sustainable industry and transport, and reduce pollution. Turning climate and environmental challenges into opportunities will make the transition just and inclusive for all. Horizon Europe aims to align its investments with the objectives of the Green Deal initiatives and to support the ecological transition⁵². The key clusters supporting the Green Deal objectives are Cluster 5 'Climate, energy and mobility' and Cluster 6 'Food, bioeconomy, natural resources, agriculture and environment'. While Cluster 5 focuses on 'deep reduction of greenhouse gas emissions in the energy and transport sectors'⁵³, Cluster 6 supports initiatives, such as the Farm to Fork Strategy, EU Biodiversity Strategy, and the Circular Economy Action Plan. In this context, the focus of the following analysis is on the European Partnerships' activities under Clusters 5 and 6 and the impacts targeted under those clusters.

Cluster 5: climate, energy and mobility

The analysis of the aggregation of PSIPs provided by the European Partnerships of Cluster 5,⁵⁴ leads to the CSIP presented in Figure 13, which provides a cumulative overview of dominant elements from PSIPs and enables the limited amount of Impact Pathways to be defined through strategy mapping from resources and actions, towards outcomes and impacts.

At this level of aggregation and identification of the dominant elements of PSIPs for groups of partnerships similar elements for all clusters are presented, in particular at the operational level. Namely, across all clusters, different aspects of access to capital (access to risk capital or access to RDI financing), cross-sector or cross-stakeholder activities (empowering, the mobilisation of stakeholders), and the alignment of legal frameworks and regulations are present as key resources and actions (fundaments) for Impact Pathways. The CSIP for Cluster 5 does not identify any cluster-specific element at the operational level.

This differs when outcomes and impacts are aggregated. Although there are similar elements across different clusters for outcomes and impacts (e.g. related to strengthening scientific capabilities, start-ups or standards and regulations), there are many more sector- and technology-specific ones. In the case of Cluster 5, the specific outcomes are related to technological sovereignty, accelerated deployment of advanced zero-emission technologies and solutions, reuse and recyclable materials, cost-effective hydrogen technologies, as well as human and technology complementarity, trustworthy interaction between all traffic participants and connected and automated mobility. These lead to specific impacts in Cluster 5 focusing on solutions for reducing greenhouse gas emissions, more efficient transport, clean energy transition, the circular economy, and development of hydrogen economy. While the circular economy is seen as one of Horizon Europe Cluster 6 impacts, the fact that it appeared in the expected impacts of Cluster 5 confirms the interconnectivity between European Partnerships and their contribution to the impacts of the other clusters.

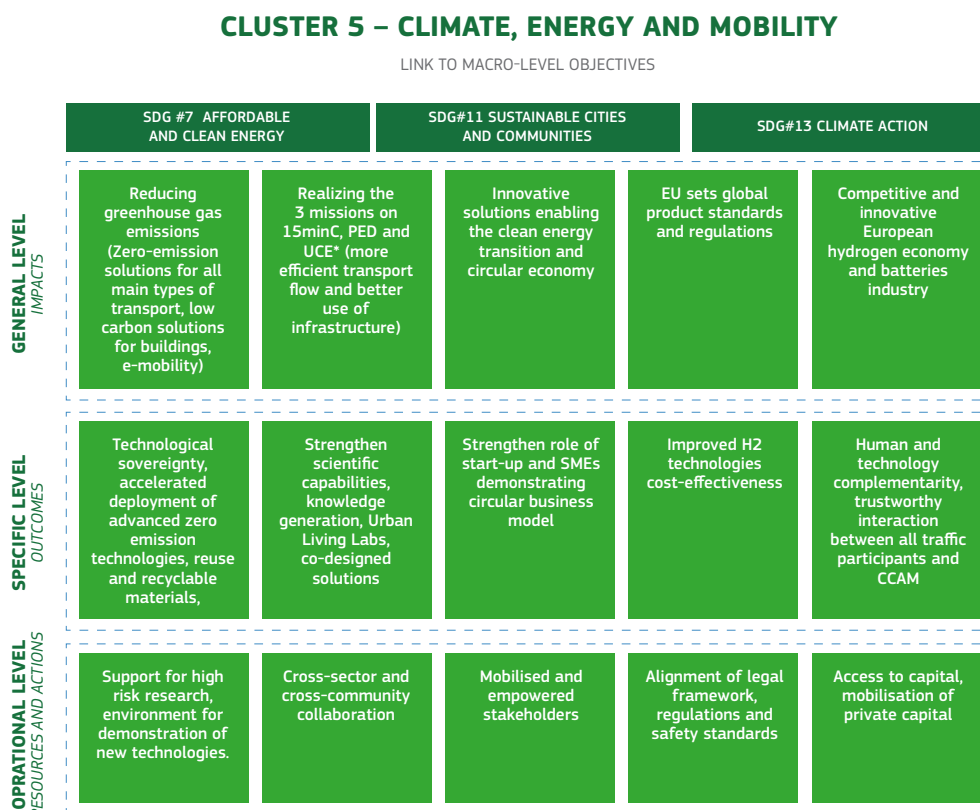
51) <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN>

52) <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/3c6ffd74-8ac3-11eb-b85c-01aa75ed71a1>, p. 10.

53) <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/3c6ffd74-8ac3-11eb-b85c-01aa75ed71a1>, p. 76.

54) The following partnerships are included in the analysis of CSIPs: Clean Hydrogen, Clean Aviation, Single European Sky ATM Research 3, Europe's Rail, 2ZERO, CCAM, BATT4EU, Zero-emission Water Transport, Built4People, Clean Energy Transition, Driving Urban Transitions.

FIGURE 13. CSIP for Cluster 5 highlighting dominant characteristics



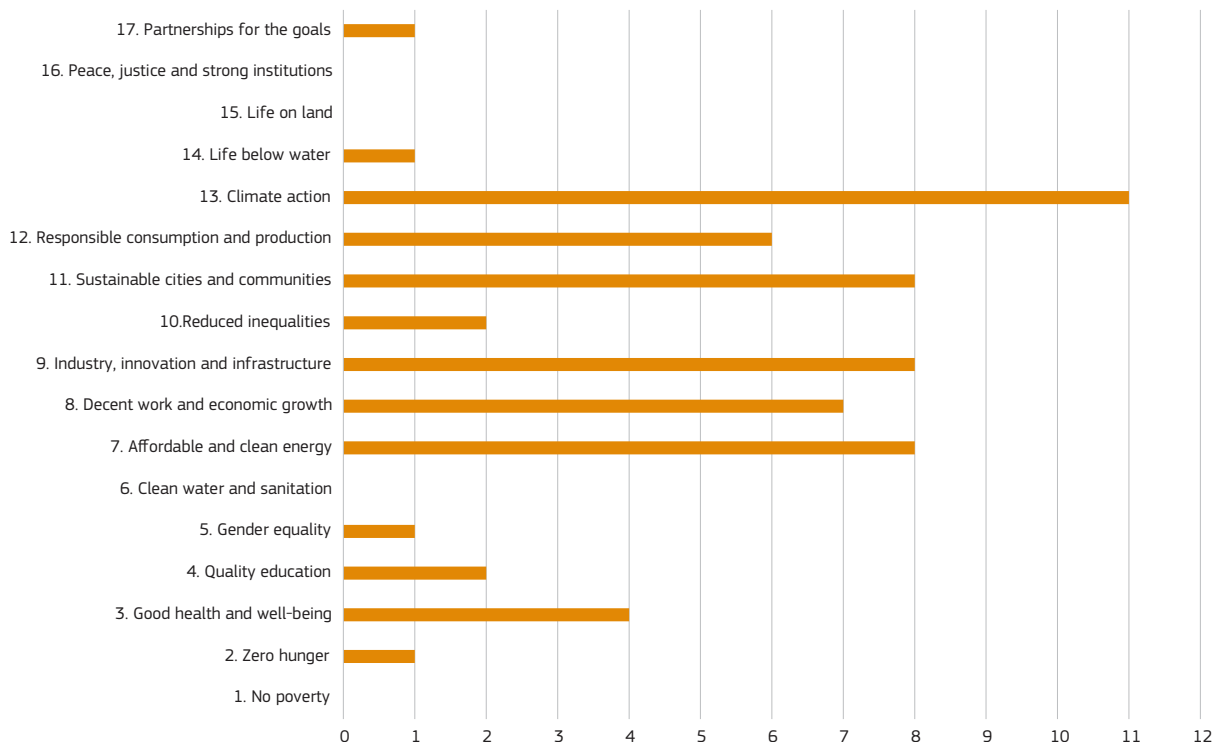
* 15 Minute Cities, Positive Energy Districts and Urban Circular Economies
Source: Expert Group analysis

The identification of SDGs #7 Affordable and clean energy, #11 Sustainable cities and communities and #13 Climate action as macro-level objectives in addition to the intervention logic (CSIP) for Cluster 5 is confirmed by analysis of the data from partnership fiches on supported SDGs, presented in Figure 14. Figure 14 presents a subset of data from Figure 12 for 11 partnerships from Cluster 5 plus 3 relevant EIT KICs: EIT Climate-KIC, EIT InnoEnergy and EIT Urban Mobility.

Each cluster creates its own specific pattern of supported SDGs which indicates areas of strategic focus. On the other hand, dispersion of data among less-supported SDGs for Cluster 5 partnerships (e.g. SDG #3 or SDG #8 and SDG#9) overlaps with SDGs of strategic focus for other clusters (Cluster 1 (#3) and Cluster 4 (#8 and #9), respectively). It clearly shows the importance of cross-cluster relations and the possible contribution (synergy) of partnerships' activities from one cluster in achieving goals of another cluster.



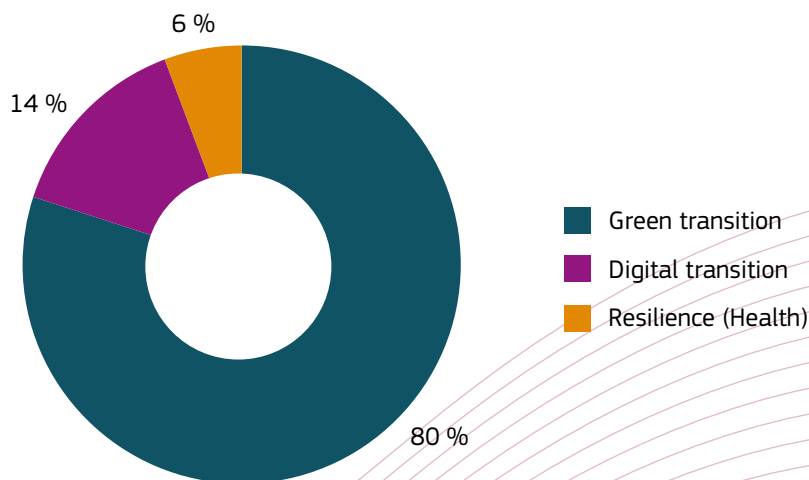
FIGURE 14. SDGs supported by Cluster 5 partnerships (11) and relevant EIT KICs (3)



Source: Expert Group analysis

This cross-cluster relations and cross-cluster contributions are even more explicit in the analysis of data presented in Figure 15. This presents data from partnership fiches on the SDGs supported from 11 Cluster 5 partnerships plus the 3 relevant EIT KICs aggregated to overview its contribution to 3 EU priority policy areas: green transition, digital transition, and resilience. Here, SDGs are aggregated to form proxies of partnerships’ contributions⁵⁵. Figure 15 confirms that besides the natural concentration of Cluster 5 partnerships’ contribution to green transformation, they also contribute to two other policy priorities in a measurable way.

FIGURE 15. Cluster 5 partnerships (11) and relevant EIT KICs (3) contribution to EU priorities



Source: Expert Group analysis

55) Green transition = Green Deal (SDGs 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 – official EC doc); Digital transformation = Europe fit for digital age (SDG 4, 9 – official EC doc); Resilience (limited to health) = arbitrary expert allocation (SDGs 3, 6).



Analysis of the expected contributions by partnerships to EC policy objectives based on the analysis of supported SDGs is very well confirmed by analysis of the data collected via the Common Indicators Survey. Table 5 presents the averages calculated from data collected for Indicator #3 Overall (public and private; in-kind and financial) investments mobilised into EU priorities by European Partnerships for the same group of partnerships as Figure 15. In particular, target values present a very similar pattern of investments into activities linked to EU policy objectives, like those presented on Figure 15.

TABLE 5. Cluster 5 – averages for 9 partnerships and 3 EIT KICs

EU priority How much resources overall are invested into activities linked to the ...	Benchmark: [%] (H2020 predecessor or based on H2020 historic data)	Target: [%]49 (whole duration of the Partnership)	Intended change: [%]
... Green Deal objectives?	66 %	84 %	27 %
... Digital objectives?	10 %	20 %	92 %
... Resilience objectives?	11 %	29 %	170 %

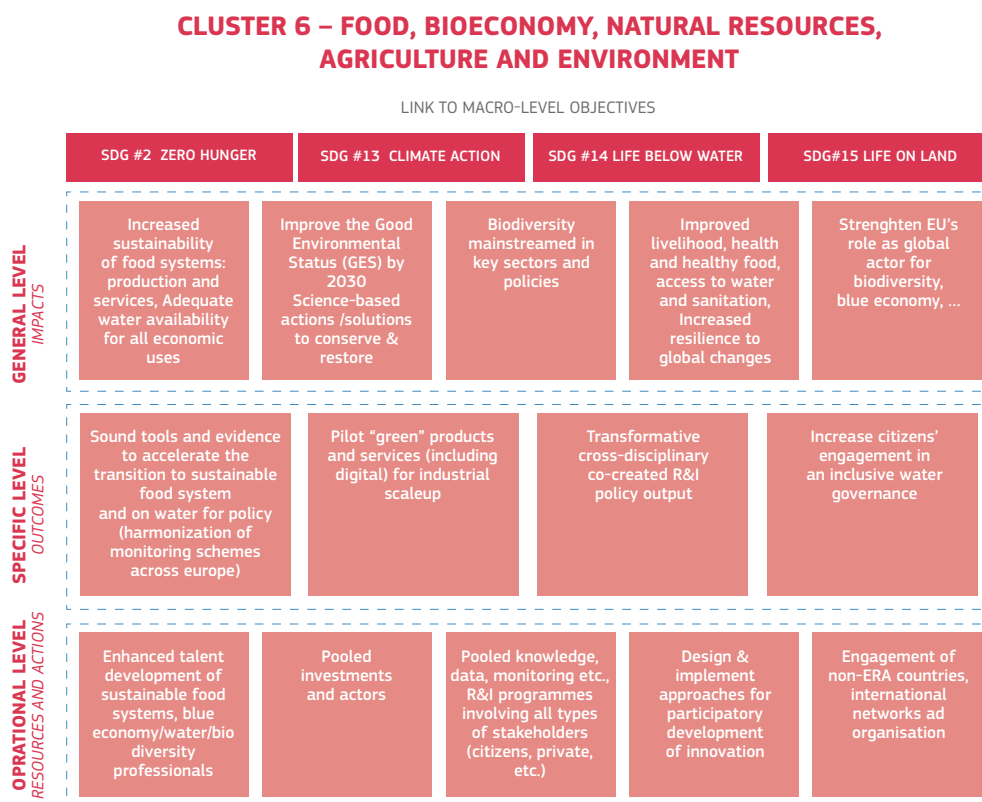
Source: Averages from EU survey November 2021

Cluster 6: Food, bioeconomy, natural resources, agriculture and environment

The analysis of the aggregation of PSIPs provided by the European Partnerships of Cluster 6 leads to the CSIP presented in Figure 16. The CSIP for Cluster 6 allows for cumulative overview of dominant elements from PSIPs and enables the limited amount of Impact Pathways to be defined through strategy mapping from resources and actions, towards outcomes and impacts. It is important to note that this analysis is made on the basis of three partnership fiches that were available for the 1st BMR (Rescuing biodiversity to safeguard life on Earth; Water4All; Climate neutral, sustainable and productive Blue Economy). This explains why some important expected impacts, such as the circular economy, are missing from the overview. A more comprehensive picture will be drawn in the next BMR when more Cluster 6 partnerships have been launched and inputs made available.

Identification of the dominant elements of PSIPs for groups of partnerships reveal that there are similar elements for all clusters presented, in particular at the operational level. Namely, across all clusters, different aspects of access to capital (access to risk capital, access to RDI financing), enhancing cross-sector or cross-stakeholder engagement (e.g. mobilisation of stakeholders), and alignment of legal frameworks and regulations are present as key resources and actions (fundaments) for Impact Pathways. However, Cluster 6 CSIP recognises further specific operational-level elements like talent development, participatory development of innovations, and the engagement of non-ERA countries and international networks.

FIGURE 16. CSIPs for Cluster 6 highlighting dominant characteristics



Source: Expert Group analysis

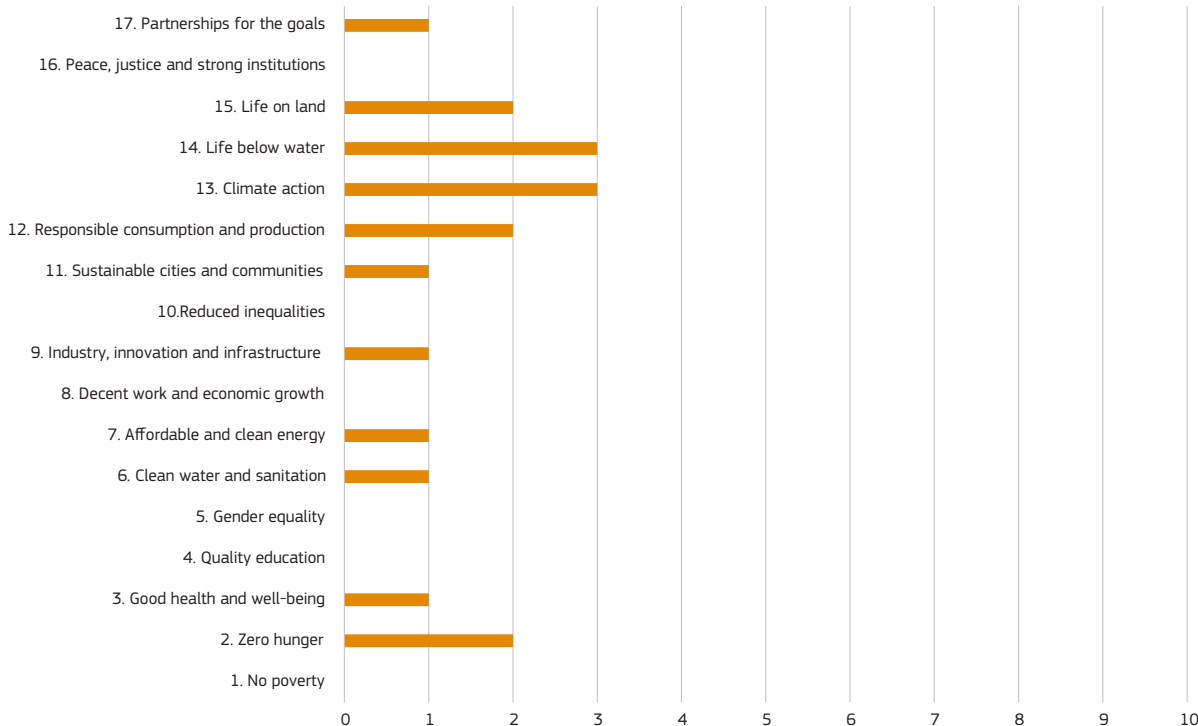
Differences between clusters become more visible when elements of outputs and impacts are aggregated for a specific cluster. Although there are similar elements across different clusters for outcomes and impacts (e.g. related to strengthening scientific capabilities, start-ups or standards and regulations), there are many more sector- and technology-specific elements. Cluster 6 specific outcomes are related to pilot green products and services, the engagement of stakeholders in specific sector policies or the harmonisation of sector-specific regulations, leading to Cluster 6 specific impacts on the sustainability of production system and services, improved good environmental status, biodiversity, healthy food, etc.

The identification of SDGs #2 Zero hunger, #13 Climate action, #14 Life below water and #15 Life on land as macro-level objectives in addition to the intervention logic (CSIP) for Cluster 6 is confirmed by analysis of the data from partnership fiches on supported SDGs presented in Figure 17. Figure 17 presents a subset of data from Figure 12 for four Cluster 6 partnerships⁵⁶.

Each cluster creates its own specific pattern of supported SDGs which indicates areas of strategic focus. On the other hand, dispersion of data among less-supported SDGs for Cluster 6 partnerships (e.g. SDG #3 or SDG #12) overlaps with SDGs of strategic focus for other clusters (cluster 1 (#3) and Cluster 4 (#12), respectively). It clearly shows the importance of cross-cluster relations and the possible contribution of partnerships' activities in one cluster to achieving goals of another cluster.

56) From the partnerships that have been launched, only the data on EIT Food is missing.

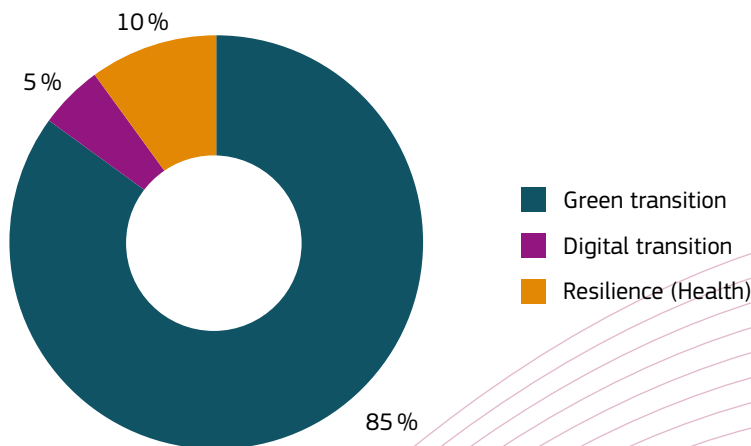
FIGURE 17. SDGs supported by Cluster 6 partnerships (4)



Source: Expert Group analysis

These cross-cluster relations and cross-cluster contributions are even more explicit through the analysis of data presented in Figure 18. Figure 18 presents data from partnership fiches on supported SDGs from four Cluster 6 partnerships plus EIT Food aggregated for an overview of its contribution to three EU priority policy areas: green transition, digital transition, and resilience. SDGs are aggregated to form proxies of partnerships’ contributions⁵⁷. Figure 18 confirms that besides the natural concentration of contributions from Cluster 6 partnerships to green transition, they also contribute to resilience in measurable way⁵⁸.

FIGURE 18. Cluster 6 partnerships’ (4) contribution to EU priorities



Source: Expert Group analysis

57) Green transition = Green Deal (SDGs 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 – official EC doc); Digital transformation = Europe fit for digital age (SDGs 4, 9 – official EC doc); Resilience (limited to health) = arbitrary expert allocation (SDGs 3, 6).
58) Digital transition is now shown on this graph due to concerns related to the link between SDGs and digital transition, as well as data availability and quality.

Analysis of partnerships' contribution to EU policy objectives based on the analysis of supported SDGs is very well confirmed by the analysis of data collected via the Common Indicators Survey. Table 6 presents the averages calculated from data collected for Indicator #3 Overall (public and private; in-kind and financial) investments mobilised into EU priorities by European Partnerships for the same group of partnerships as in Figure 18. In particular, target values present a similar pattern of investments into activities linked to EU policy objectives as those presented in Figure 18. Here, the contribution to digital transformation and resilience is even more explicit and meaningful than in the analysis presented in Figure 18.

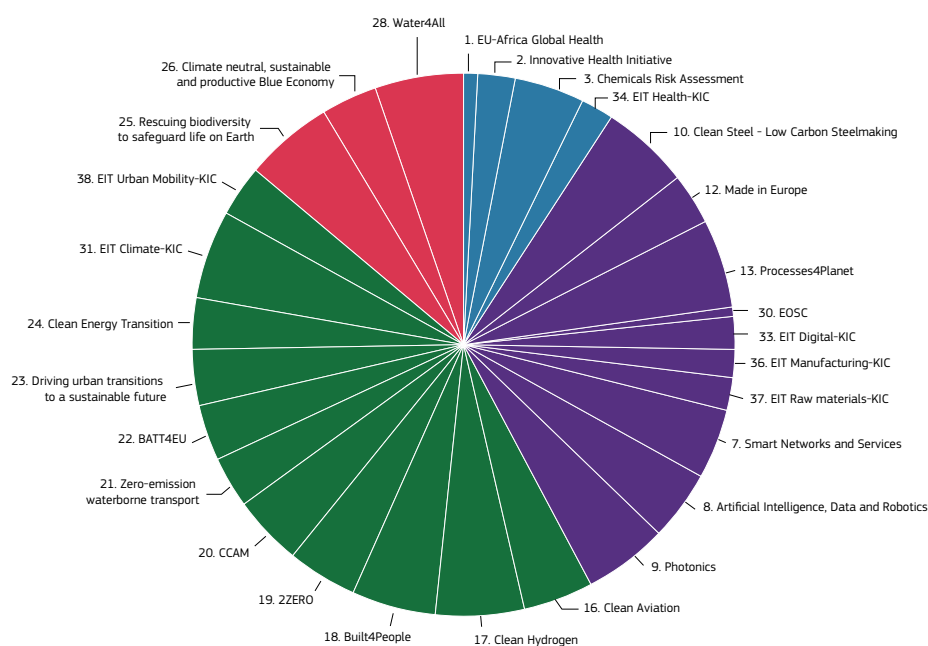
TABLE 6. Cluster 6 – averages for 3 partnerships*

EU priority How much resources overall are invested into activities linked to the ...	Benchmark: [%] (H2020 predecessor or based on H2020 historic data)	Target: [%]49 (whole duration of the Partnership)	Intended change: [%]
... Green Deal objectives?	75%	80%	7%
... Digital objectives?	16%	51%	231%
... Resilience objectives?	15%	19%	25%

Source: Averages from EU survey November 2021. *Data for EIT Food not available

Figure 19 shows that the partnerships with a primary focus on the green transition (Cluster 5) account for a sizeable share of European Partnerships' total contribution to the green transition. However, the total contribution of all other partnerships exceeds that of the primarily green-transition-oriented partnerships. This indicates that there is significant potential to identify and capture synergies and potential for cooperation, especially between clusters 4, 5 and 6.

FIGURE 19. Contribution of all active partnerships to the green transition



Source: Expert Group analysis. Cluster 1 + relevant EIT KICs – blue, Cluster 4 + relevant EIT KICs + EOSC – violet, Cluster 5 + relevant EIT KICs – green, Cluster 6 – red



The potential for synergies can also be observed by analysing the anecdotal evidence found in the partnership fiches (Chapter 4). Some of these are presented in boxes below.

BOX 3. BLUE ECONOMY PARTNERSHIP COLLABORATION WITH OTHER EUROPEAN PARTNERSHIPS

‘A climate neutral, sustainable and productive Blue Economy (SBEP) partnership will enable a just and inclusive transition to a climate-neutral, sustainable and productive blue economy for key intervention areas for healthy oceans and the wellbeing of citizens in harmony with nature.

From the outset of the SBEP’s intervention areas, coordination will be sought with relevant European co-funded and co-programmed partnerships as well as Joint Programming Initiatives to foster alignment and exchange praxis as well as avoiding duplication.

Key partners include: JPIs Healthy and Productive Seas and Oceans and Connecting Climate Knowledge for Europe, and the European Partnerships Rescuing Biodiversity to Safeguard Life on Earth (Biodiversa+), Zero-emission Waterborne Transport; Clean Energy Transition; Water4All; Safe and Sustainable Food Systems; European Open Science Cloud; Artificial Intelligence, Data and Robotics; EIT Digital, EIT Raw Materials; and Innovative SMEs

Some relevant Blue Economy KPIs:

- Environmental resilience
- Citizens’ well-being.’

Source: partnership fiches

BOX 4. BIODIVERSA+ COLLABORATION WITH OTHER RELEVANT PARTNERSHIPS

‘Through direct dialogue, and via relevant discussion fora, Biodiversa+ will ensure coherence and collaboration with other relevant partnerships (Accelerating Farming Systems Transitions; Water4All; Sustainable and Productive Blue Economy; Driving Urban Transitions, possibly also Circular Bio-based Europe; and Animal Health and Welfare) while designing and rolling out its flagship programmes. This will allow the partnership to tackle issues at the interface between biodiversity loss and other societal challenges. Partnerships can cover similar topics, but approach them from a different, complementary angle.

Some relevant Biodiversa+ KPIs:

- Uptake of nature-based solutions
- Shared monitoring priorities.’

Source: partnership fiches

BOX 5. WATER4ALL PARTNERSHIP EFFORTS TO ALIGN WITH NATIONAL STRATEGIES

'Water JPI arose as a process whereby partner states agreed on a common vision to address major challenges and enable the alignment of national priorities. Members succeeded in the development in 2016 of a common strategic research and innovation agenda that has been recently updated and that outlines key RD&I areas for the sustainable management of water resources. Alignment activities have also allowed the launch of joint processes of research practices and project management as well as the identification of collaboration barriers. The set-up of mirror groups in some member countries has contributed to the better alignment of national strategies with Water JPI's priorities.

Some relevant Water4All KPIs:

- Population access to drinking water
- Population access to sanitation

This partnership contributes to (among others) SDG6: Clean water and sanitation that can be considered as transversal between the Green Deal and resilience.'

Source: partnership fiches

2.2.2 DIGITAL TRANSITION

The EU's digital transformation refers to the adoption of new, high-impact emerging technologies in businesses, science, and society. The EU's digital strategy⁵⁹ aims to make this transformation work for people and businesses while helping to achieve the European Green Deal objectives⁶⁰ and addressing challenges in society and the economy by an increasing need for resilience, such as that illustrated by the COVID-19 pandemic. Europe must now strengthen its digital sovereignty and set standards, rather than following those of others, with a clear focus on data, technology and infrastructure. The latest EU commitments to the digital transition and a smarter and greener use of technologies will help make Europe the first climate-neutral continent by 2050. Technology can improve energy and resource efficiency, facilitate the circular economy, lead to a better allocation of resources, and reduce emissions, pollution, biodiversity loss and environmental degradation. At the same time, the ICT sector must ensure the environmentally sound design and deployment of digital technologies. Horizon Europe aims to support the objectives of the EU's digital strategies⁶¹. While all Horizon Europe clusters contribute to the digital transition, Cluster 4 'Digital, industry and space' which supports 'the development and mastery of digital and key enabling technologies of the future'⁶² is the key cluster enabling this. This is the reason why the following analysis focuses on the activities of the European Partnerships under Cluster 4.

Cluster 4: digital, industry and space

The analysis of the aggregation of PSIPs provided by the European Partnerships of Cluster 4⁶³ leads to the CSIP presented in Figure 20, which allows for a cumulative overview of dominant elements from PSIPs and enables the limited amount of Impact Pathways to be defined through strategy mapping from resources and actions, towards outcomes and impacts.

59) <https://digital-strategy.ec.europa.eu/en/policies/europes-digital-decade#ecl-inpage-kyvdsotr>

60) <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0118>

61) <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/3c6ffd74-8ac3-11eb-b85c-01aa75ed71a1>, p. 4.

62) <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/3c6ffd74-8ac3-11eb-b85c-01aa75ed71a1>, p. 9.

63) The following partnerships are included in the analysis of CSIPs: Smart Networks and Services, AI, Data and Robotics, Photonics, Made in Europe, Clean Steel - Low Carbon Steelmaking, Processes4Planet.

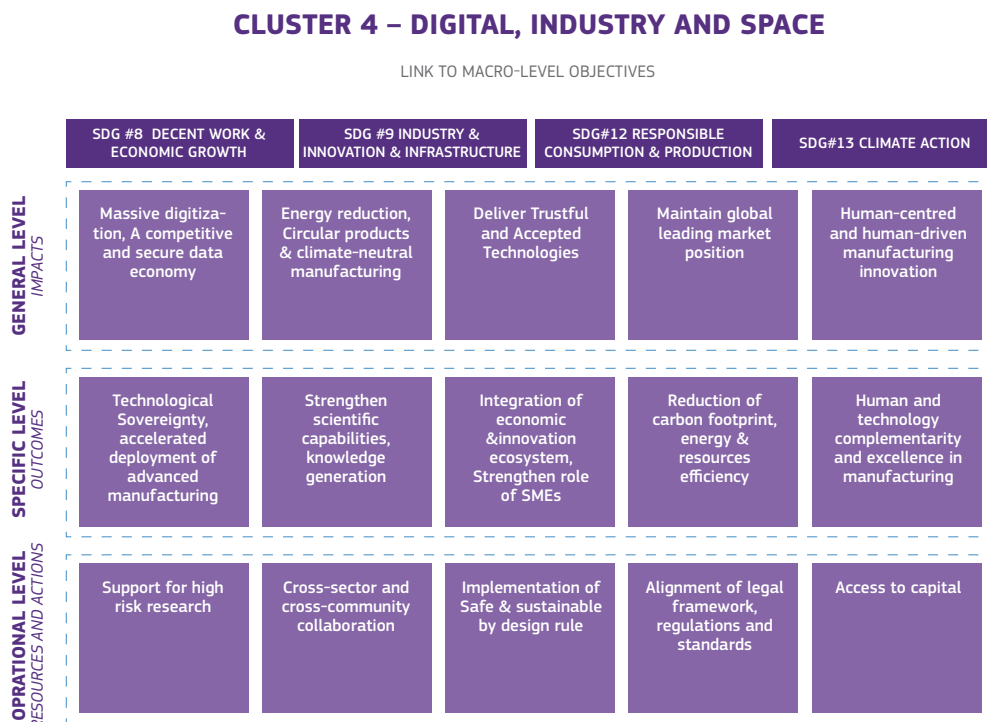


The identification of dominant elements of PSIPs for this group of partnerships reveals many of the same elements as for other clusters at the operational level. Different aspects of access to capital (access to risk capital or access to RDI financing), enhancement of cross-sector or cross-stakeholder activities (mobilisation of stakeholders), and the alignment of legal frameworks and regulations are present as key resources and actions (fundaments) for Impact Pathways. The CSIP for Cluster 4 does not present any further specific elements at the operational level.

Although there are similar elements across different clusters for outcomes and impacts (e.g. related to strengthening scientific capabilities, start-ups or standards and regulations), there are also more sector- and technology-specific elements. Cluster 4 specific outcomes relate to technological sovereignty, accelerated deployment of advanced manufacturing, reduction of the carbon footprint, energy and resources efficiency, and human and technology complementarity and excellence in manufacturing. These lead to Cluster 4 specific impacts on massive digitisation, a competitive and secure data economy, energy reduction, circular products and climate-neutral manufacturing, as well as on human-centred and human-driven manufacturing innovation.

This is also supported by an analysis of the anecdotal synergy stories from the fiches in which, for example, the partnership Made in Europe (Cluster 4) has described how it will collaborate with other partnerships in Cluster 5, such as the European Partnership towards Zero-emission Road Transport (2ZERO) and Clean Aviation. The Clean Aviation JU highlights synergies outside of Cluster 5, including existing opportunities with Key Digital Technologies JU, other research instruments related to digital technologies, the Made for Europe Partnership, and the EU space initiative (especially where it concerns hydrogen-related technologies). Although manufacturing is not at the core of these partnerships, they are strongly integrated into manufacturing. The Smart Network and Services JU also describes how it will explore future cooperation opportunities – towards realising the 6G vision – with a key vertical sector of European society, leveraging existing agreements with industry but also extending to further sectors in health and utilities. There are also significant synergies and interlinkages between clusters 1 and 4, especially in the Innovative Health Initiative and the upcoming partnership for Personalised Medicine, and how they deploy and create impact by digital data-driven solutions in the form of AI and advanced computing.

FIGURE 20. CSIPs for Cluster 4 highlighting dominant characteristics

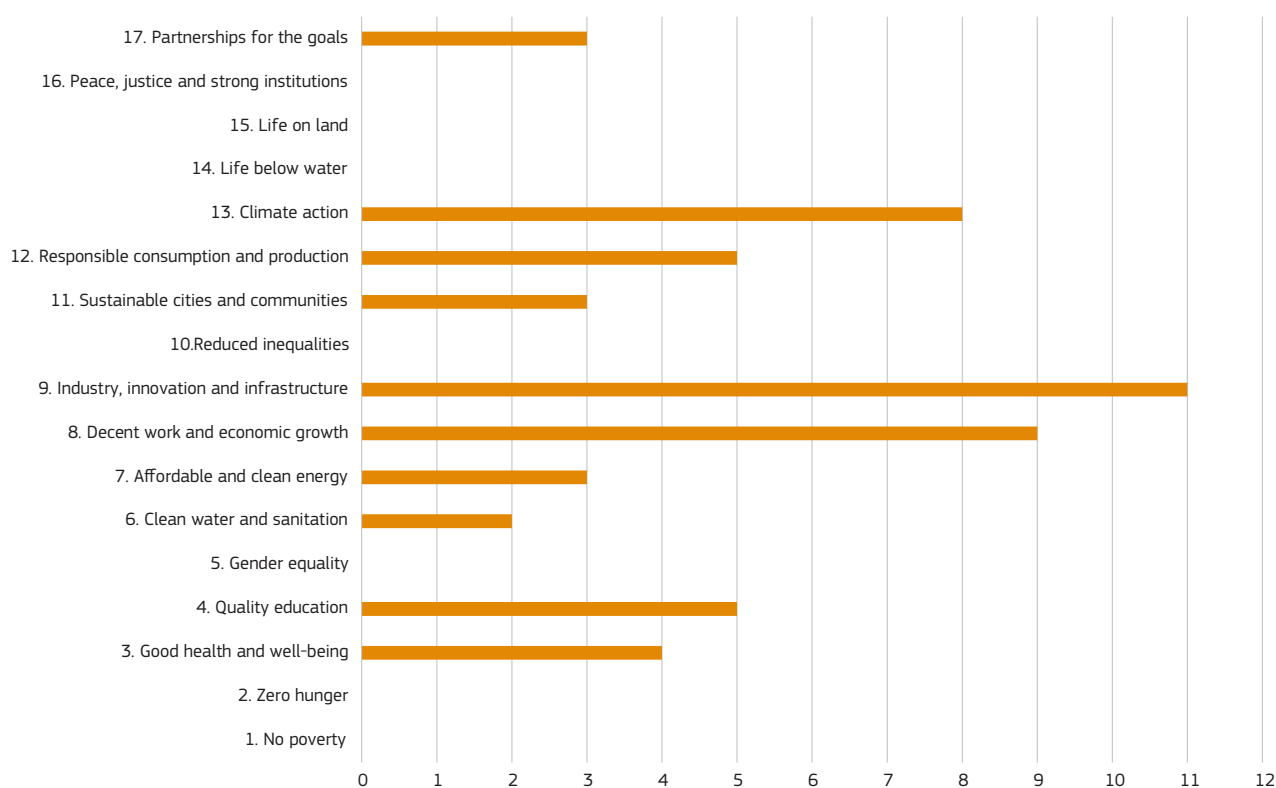


Source: Expert Group analysis

The identification of SDGs #8 Decent work and economic growth, #9 Industry, innovation and infrastructure, #12 Responsible consumption and production, and #13 Climate action, as macro-level objectives in addition to the intervention logic (CSIP) for Cluster 4, is confirmed by the analysis of data from partnership fiches on supported SDGs presented in Figure 21. Figure 21 presents a subset of data from Figure 12, with eight partnerships from Cluster 4 plus EOSC and 3 EIT KICs: EIT Digital, EIT Manufacturing and EIT Raw Materials.

The dispersion of data among less-supported SDGs for Cluster 4 partnerships (e.g. SDG #3 or SDG #11) overlaps with SDGs of strategic focus for other clusters (Cluster 1 (#3) and Cluster 5 (#11), respectively). It clearly shows the importance of cross-cluster relations and the possible contribution of partnerships' activities in one cluster to achieving goals of another cluster.

FIGURE 21. SDGs supported by Cluster 4 partnerships (9) and relevant EIT KICs (3)



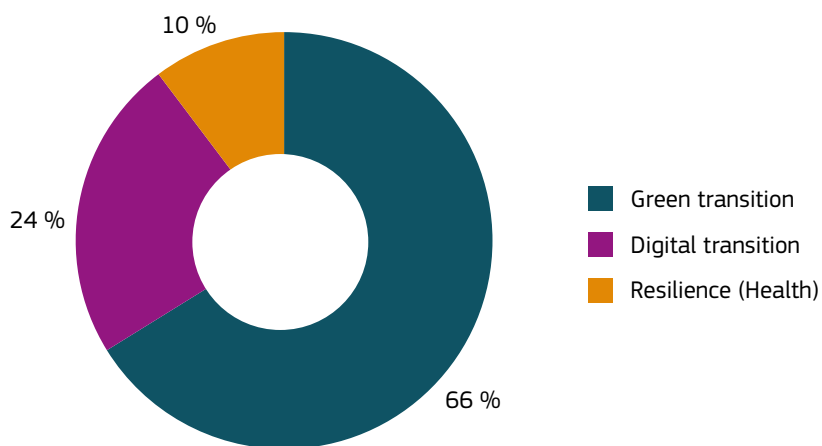
Source: Expert Group analysis

These cross-cluster relations and cross-cluster contributions are even more explicit through the analysis of data presented in Figure 22. Figure 22 presents data from partnership fiches on supported SDGs from eight Cluster 4 partnerships plus EOSC and three relevant EIT KICs aggregated to give an overview of its contribution to three EU priority policy areas: green transition, digital transition, and resilience. The SDGs are aggregated to form proxies of the partnerships' contribution⁶⁴. Figure 22 confirms that besides the concentration of contributions from Cluster 4 partnerships to the green transition (biased by the allocation of a high number – 12 out of 17 – SDGs to that category), a large contribution goes to the digital transition and a smaller one to the resilience objectives.

64) Green transition = Green Deal (SDGs 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 – official EC doc); Digital transformation = Europe fit for digital age (SDGs 4, 9 – official EC doc); Resilience (limited to health) = arbitrary expert allocation (SDGs 3, 6).



FIGURE 22. Cluster 4 partnerships (6) and relevant EIT KICs (3) contribution to EU priorities



Source: Expert Group analysis

The analysis of partnerships' contribution to European policy objectives based on an analysis of supported SDGs is not fully supported by the analysis of data collected from partnerships via the Common Indicators Survey. Table 7 presents averages calculated from data collected for Indicator #3 Overall (public and private; in-kind and financial) investments mobilised into EU priorities by European Partnerships for almost the same group of partnerships⁶⁵ as Figure 22. The most important target values present a pattern of a fair distribution of investments into activities linked to all EU policy objectives that is significantly different from that presented in Figure 22.

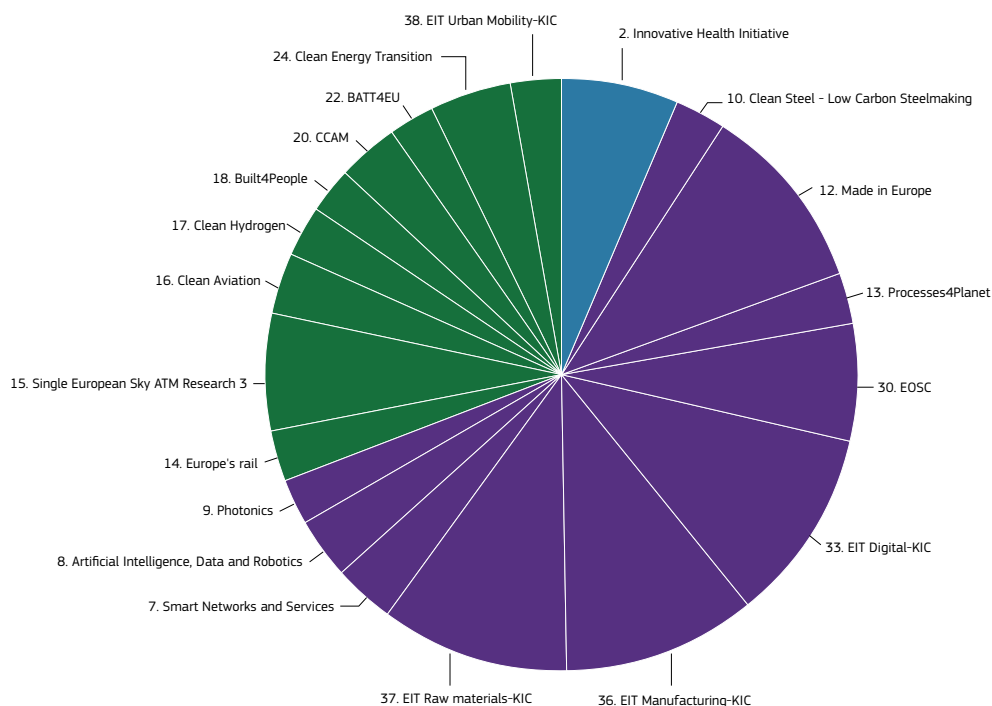
TABLE 7. Cluster 4 – averages for six partnerships, EIT Digital, EIT Manufacturing and EOSC

EU priority How much resources overall are invested into activities linked to the ...	Benchmark: [%] (H2020 predecessor or based on H2020 historic data)	Target: [%]49 (whole duration of the Partnership)	Intended change: [%]
... Green Deal objectives?	24%	48%	98%
... Digital objectives?	24%	53%	124%
... Resilience objectives?	20%	37%	86%

Source: Averages from EU survey November 2021

65) Data for EIT Raw Materials was not available.

FIGURE 23. Contribution of all partnerships to the digital transition



Source: Expert Group analysis. Cluster 1 + relevant EIT KICs – blue, Cluster 4 + relevant EIT KICs + EOSC – violet, Cluster 5 + relevant EIT KICs – green

Figure 23 shows the contribution of all European Partnerships covered by this report to digital priorities. While contributions from Cluster 4 partnerships are dominant, it can be clearly seen that the contributions – particularly Cluster 5 – are sizeable. It is therefore likely that potential synergies may be identified and captured between partnerships allocating resources to address both digital and green transitions. Potential for cooperation can also be found between partnerships oriented to digital transition and resilience which, in Figure 23, has a limited scope of health.

The potential for synergies can also be observed by analysing the anecdotal evidence found in the partnership fiches (Chapter 4).

BOX 6. EUROPEAN PARTNERSHIP FOR AI, DATA AND ROBOTICS IS ENGAGED IN DEVELOPING SOLUTIONS ADDRESSING VARIOUS SOCIETAL CHALLENGES RELATED TO, FOR EXAMPLE, GREEN TRANSITION AND RESILIENCE

‘European artificial intelligence (AI), data and robotics are at the core of developing a modern society in all of its facets. They will create new opportunities and be principal drivers of innovation, productivity and economic growth. At the same time, they will help us to solve some of our greatest challenges in the sectors of health, energy, transportation, manufacturing, agriculture and protecting our environment, which will have a major impact on European citizens and society as a whole. Through its founding organisations, the AI, Data and Robotics Association (Adra) is building a broad coalition of diverse stakeholders to leverage the communities that underpin European AI, data and robotics. AI, data and robotics will create new opportunities, transform many, if not all, of the verticals and ultimately shift the balance of power in the shortest possible time. Together, they can be used to solve the greatest challenges we face: environmental sustainability, energy, food and water security, and improving health and quality of life. Collaboration within the European Partnership will deliver Europe’s vision for a human-centric and trustworthy use of AI, data and robotics.

This partnership contributes to SDG 3: Good health & well-being.’

Source: partnership fiches

2.2.3 RESILIENCE

There is no doubt that the COVID-19 pandemic affected our societies in profound and multifaceted ways. Far beyond the public health threat, the pandemic crisis caused economic dislocations, social disruptions and information disorder that have tested political processes and institutions. On the other hand, the COVID-19 pandemic has also opened opportunities for positive change and innovative new solutions that research actions could help to identify and grasp. Horizon Europe aims to accelerate Europe's recovery and resilience⁶⁶. While the goal of several Horizon Europe clusters is to contribute to the EU resilience objectives, Cluster 1 on health is crucial in terms of tackling infectious diseases, ensuring access to innovative and high-quality health care, and maintaining a globally competitive health-related industry. Without a doubt, the biggest achievement of international public and private science was the development of COVID-19 vaccines in a very short time. Given this, it seems appropriate to focus the analysis of partnerships' contribution to resilience partly on health as represented by Cluster 1.

Cluster 1: health

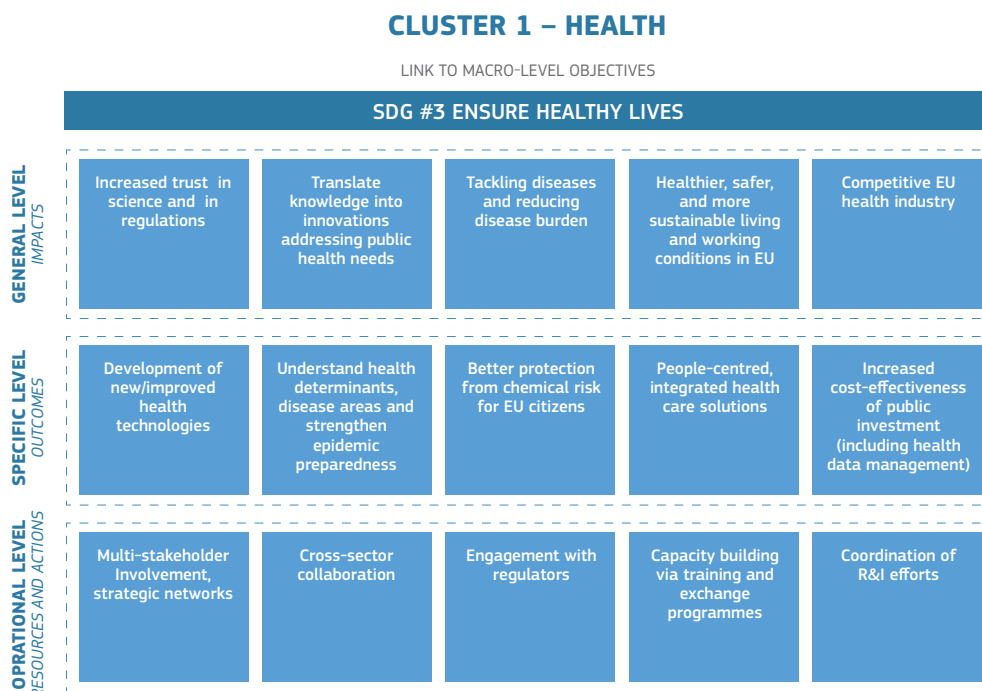
The analysis of the aggregation of PSIPs provided by the European Partnerships of Cluster 1 leads to the CSIP presented in Figure 24, which enables a cumulative overview of the dominant elements from the PSIPs and allows for the limited amount of Impact Pathways to be defined through strategy mapping from resources and actions, towards outcomes and impacts. It is important to note that this analysis is based on three partnership fiches that were available for the 1st BMR (Global Health EDCTP3, Innovative Health Initiative, and Risk Assessment of Chemicals). A more comprehensive picture will be drawn in the next BMR when more Cluster 1 partnerships have been launched and inputs are made available.

Different aspects of access to capital (access to risk capital or access to RDI financing), enhancement of cross-sector or cross-stakeholder activities (mobilisation of stakeholders), and the alignment of legal frameworks and regulations are also present as key resources and actions (fundaments) for Impact Pathways in Cluster 1. In addition to these common features, Cluster 1 CSIP recognises specific operational-level elements such as capacity building and training.

Similar elements across all clusters for outcomes and impacts (e.g. related to strengthening scientific capabilities, start-ups or standards and regulations) are also repeated in Cluster 1. However, there are also sector- and technology-specific outcomes related to new health technologies, health determinants and epidemic preparedness, protection from chemical risk, integrated health-care solutions, etc. These lead to Cluster 1 specific impacts on increased trust to science and regulations, diseases and disease burden, and healthier, safer, and more sustainable working conditions, etc.

66) <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/3c6ffd74-8ac3-11eb-b85c-01aa75ed71a1>, p. 3.

FIGURE 24. CSIPs for Cluster 1 highlighting dominant characteristics



Source: Expert Group analysis

The specific characteristics of Cluster 1 CSIPs are further illustrated by anecdotal evidence presented in the boxes below.

BOX 7. EUROPEAN PARTNERSHIP FOR RISK ASSESSMENT OF CHEMICALS (PARC) STRENGTHENING STAKEHOLDER INTERACTIONS

‘PARC will strengthen interactions between the research community, risk assessors at EU and national regulatory level and other chemical risk assessment stakeholders (industry, NGO, citizens, etc.). The National Hubs (NHs) network will act as fora for discussion between chemical risk assessment stakeholders and provide crucial opportunities to cooperate and create synergies with all actors involved in chemical risk assessment.

The NHs will allow the harnessing of all available expertise on the ground and guarantee a close feedback loop between PARC and national programmes. These NHs are of utmost relevance to disseminate PARC interests and outputs, and to raise citizens’ awareness.

Moreover, the partnership has been designed to deliver outputs corresponding to the needs of end-users. To do so, it will ensure close collaboration between EU and national chemical risk assessment and management authorities. Concretely, a Science to Policy dialogue (S2PD) and interface will be implemented to build a joint R&I risk assessment hub of excellence to address chemical safety challenges. This S2PD will allow to identify the priorities in terms of risk assessment and risk management and to facilitate the uptake of PARC results contributing to create a sustainable engagement of the chemical risk assessment community on joint R&I priorities.

Some relevant PARC KPIs:

- Reuse of scientific and regulatory data
- Endorsement of chemical risk assessment innovation in policy
- Citizen trust in science and regulations.

This partnership is also linked to SDG 12: Responsible consumption and production, so it may also indirectly contribute to other clusters.’

Source: partnership fiches

BOX 8. GLOBAL HEALTH EDCTP3 PARTNERING WITH WHO AND OTHER INTERNATIONAL ORGANISATIONS

‘WHO is a key partner for EDCTP and collaboration is happening at strategic and technical levels, with EDCTP staff actively participating in several WHO policy and technical advisory group meetings. EDCTP representatives participate in a variety of committees and working groups established by WHO, including the WHO R&D Blueprint Global Coordination Mechanism, several workstreams coordinated by the WHO Global Malaria Programme to address the double challenge of malaria & COVID-19, and the WHO-AFRO Expert Committee on Traditional Medicine for COVID-19.

EDCTP became an active member of the ESSENCE on Health Research platform in 2020, an initiative that allows donors and funders to identify synergies, establish coherence and increase the value of resources for health research. EDCTP contributed to 1) the ESSENCE Working Group of Review of Investments (WGRI), which is developing a coordination mechanism for reviewing investments in clinical research capacity building in response to the World Bank and Coalition for Epidemic Preparedness and Innovation (CEPI) report *Money and Microbes: Strengthening Research Capacity to Prevent Epidemics*; as well as 2) the publishing and dissemination of a good practice document to guide funders on the best ways to invest in implementation science.

Finally, in September 2020, EDCTP became a member-observer of the Global Research Collaboration for Infectious Disease Preparedness GloPID-R network, an alliance bringing together research funding organisations on a global scale to facilitate effective and rapid research to address a significant outbreak of a new or re-emerging infectious disease with epidemic and pandemic potential.

Some relevant EDCTP3 KPIs:

- R&I Epidemic preparedness in sub-Saharan Africa
- Cost-effectiveness of public investment
- Sustainable global health research networks
- Health security.’

Source: partnership fiches

BOX 9. INNOVATIVE HEALTH INITIATIVE (IHI) PARTNERING WITH REGULATORS AND INTERNATIONAL ORGANISATIONS

‘IHI plans to explore future synergies with the planned public European Partnership on Transforming Health and Care Systems (THCS) which will be of particular importance as it may provide input for identifying scientific priorities, notably regarding unmet public health needs. Solutions proposed in the context of IHI could enable organisational innovations developed in the public-public THCS partnership.

Some relevant IHI KPIs:

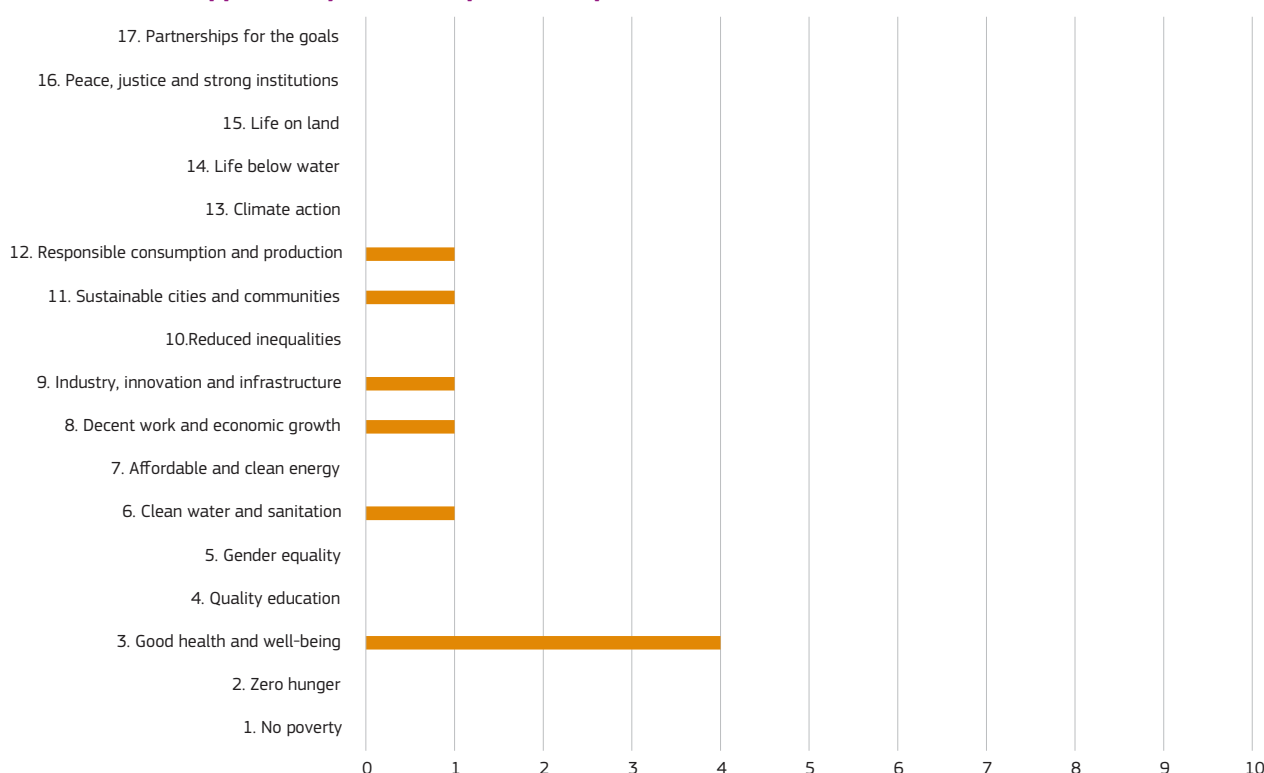
- Regulator engagement
- Integrated health-care solutions and value assessment of integrated solutions
- AI feasibility in health care
- Strategies to address unmet public health needs (WHO list)
- Globally competitive EU health-care industry.’

Source: partnership fiches

The identification of SDG #3 Ensure healthy lives, as a macro-level objective in addition to the intervention logic (CSIP) for Cluster 1, is confirmed by analysis of data from the partnership fiches on supported SDGs, presented in Figure 25. Figure 25 presents a subset of data from Figure 12 for three partnerships from Cluster 1 plus EIT Health.

The dispersion of data among less-supported SDGs for Cluster 1 partnerships (e.g. SDG #8 and SDG #9 or SDG #11) overlaps with SDGs of strategic focus for other clusters (Cluster 4 (#8 and #9) and Cluster 5 (#11) respectively). It clearly shows the importance of cross-cluster relations and the possible contribution of partnerships' activities from one cluster to achieving goals of another cluster.

FIGURE 25. SDGs supported by Cluster 1 partnerships (3) and EIT Health



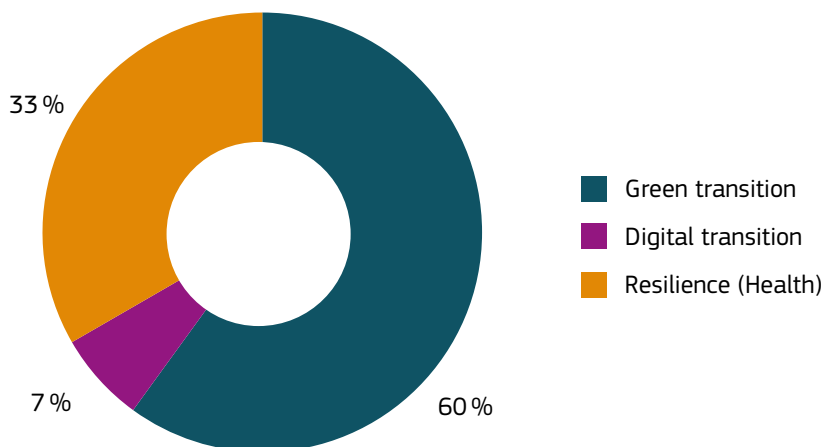
Source: Expert Group analysis

The cross-cluster relations and cross-cluster contributions are even more explicit through the analysis of data presented in Figure 26. Figure 26 presents data from partnership fiches on supported SDGs from three Cluster 1 partnerships plus EIT Health, aggregated to give an overview of its contribution to three EU priority policy areas: green transition, digital transition and resilience. The SDGs are aggregated to form proxies of partnerships' contributions⁶⁷. Figure 26 confirms that, besides the statistically biased concentration of contributions by Cluster 1 partnerships to green transformation, a large contribution goes to resilience while a small but still measurable one goes to digital transformation.

67) Green transition = Green Deal (SDGs 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 – official EC doc); Digital transformation = Europe fit for digital age (SDGs 4, 9 – official EC doc); Resilience (limited to Health) = arbitrary expert allocation (SDGs 3, 6).

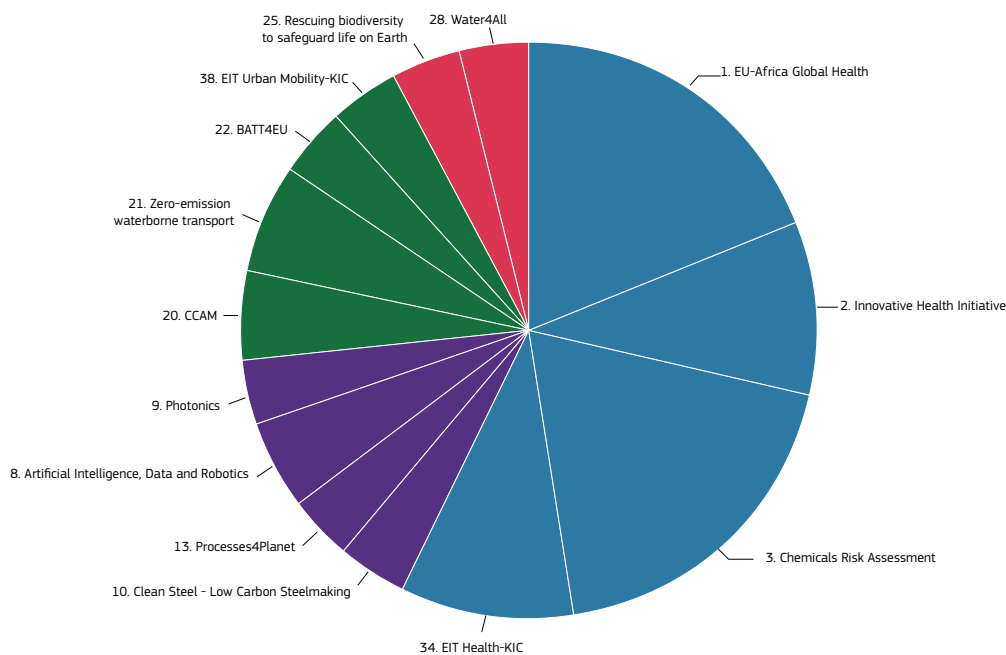


FIGURE 26. Cluster 1 partnerships (3) and EIT Health contribution to EU priorities



Source: Expert Group analysis

FIGURE 27. Contribution of all partnerships to health-related resilience



Source: Expert Group analysis. Cluster 1 + relevant EIT KICs – blue, Cluster 4 + relevant EIT KICs + EOSC – violet, Cluster 5 + relevant EIT KICs – green, Cluster 6 – red

Figure 27 shows the contribution of European Partnerships to health-related resilience. While the major contribution comes from Cluster 1, sizeable contributions are also made by all other clusters. The potential for synergies is evident in combinations of health with digitalisation, new materials, and processes, as well as environmental issues. This potential is likely to be much higher when all the relevant dimensions of resilience are covered.

2.3 CONTRIBUTION OF PARTNERSHIPS TO HORIZON EUROPE KEY IMPACT PATHWAYS

The purpose of this subchapter is three-fold: first, to illustrate the direct links of the Key Performance Indicators (KPIs) devised by the partnerships with the Horizon Europe KIP indicators, reflecting the integration of the partnerships as an instrument in the overall monitoring and evaluation of Horizon Europe. Second, the aim is to suggest possible ways of analysing the data on Horizon Europe KIPs as they become available for the next BMRs. Third, the objective is to select a subset of Horizon Europe KIPs that are worth presenting specifically for the partnerships, reflecting key elements of their intervention logic.

With a new level of ambition to boost the diversity of impacts of EU R&I funding, the Commission’s proposal for Horizon Europe includes an approach for capturing and communicating impacts – the KIPs. The objective of this new approach is to allow policymakers and the wider public to get regular insights into the effects of and benefits from the Programme over time for European science, its economy, and the wider society.

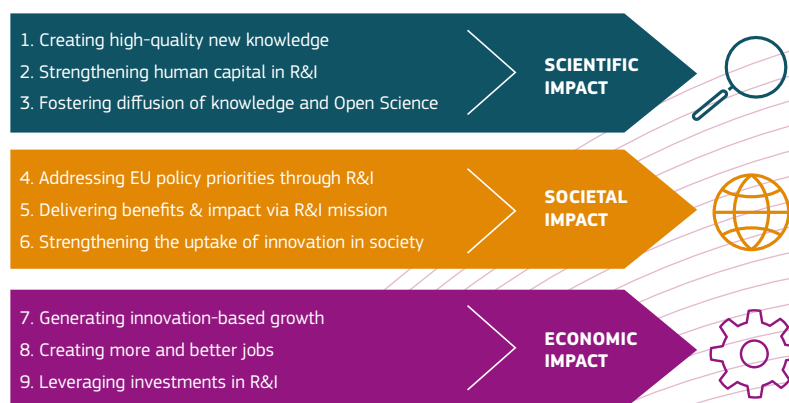
The Key Impact Pathways (Figure 28) will allow the difference made around nine key storylines to be captured and communicated at any given moment in time (both during and after the Programme). European Partnerships fully integrated into the Horizon Europe monitoring framework feed into the KIPs through their proposals and project-level data.

Demonstrating and communicating the diversity of impacts and the European added value of R&I investments, including those achieved through partnerships, is crucial for accountability, advocacy, and learning. However, capturing these impacts is not straightforward and requires dealing with complexities. Attribution/contribution, time lags, and uncertainty/risk are among the key challenges faced by the evaluators of impacts of R&I investments worldwide.

The KIPs focus on the most typical changes that are expected to occur in the short, medium, and longer term as a result of EU-funded activities targeted at the programme objectives. They combine the latest developments in understanding, measuring, and assessing the scientific, societal, and economic impact of R&I programmes.

The data-collection methods behind the proposed indicators allow for the tracking of additional disaggregated indicators based on the same dataset. In addition, and beyond KIP indicators, programme implementation and management data will also be collected and reported in close to real time, including the monitoring of collaborative links through network visualisations. This will include, *inter alia*, data on proposals, applications, participations and projects; applicants and participants (including type of organisation, country, gender, role in project, scientific discipline/sector, etc.); and contributions to thematic objectives such as climate. This data will also be collected from the Horizon Europe partnership projects.

FIGURE 28. Nine KIPs in Horizon Europe



Source: Horizon Europe Key Impact Pathways, EC, 2020



The KIPs underpinning Horizon Europe's monitoring system represent a novel, ambitious yet pragmatic approach to devising indicator frameworks for R&I programmes. It results from the identified need to start facing the complexity of R&I investments in monitoring and evaluation practices in order to deliver relevant and timely messages to policymakers. Based on a set of core principles (Proximity, Attribution, Traceability, Holism, and Stability = PATHS)⁶⁸, this framework ensures information is collected on a set of key dimensions where impact is desired.

Overall, the KIPs are expected to support the better capture and communication of Horizon Europe's progress towards its objectives, and also beyond its lifetime. The simplicity and storytelling nature of the KIPs is expected to bring a more immediate and continuous visibility of the European added value of R&I investments for science, the economy and society, and enable this to reach a wider audience beyond the R&I community.

2.3.1 LINKS BETWEEN PARTNERSHIP KPIS AND HORIZON EUROPE KIPS

The Key Impact Pathways directly relate to and capture the value envisaged from partnerships' projects. As stated in the First interim report of the Expert Group on support for the Strategic Coordinating Process for partnerships⁶⁹, there may be a significant overlap between the specific indicators (KPIs) of some partnerships and the Horizon Europe KIPs. Horizon Europe KIPs may be considered as a bridge between the activities and impacts of the specific partnerships and the overall Horizon programme, for which the KIPs will be applied to report on the achievement of the entire programme. Throughout the process of developing their monitoring and evaluation frameworks, the partnerships have tried to interpret the KIPs at the partnerships level.

As seen in the partnership fiches (Chapter 4), each partnership has developed its own PSIP to frame and guide their monitoring and evaluation tasks. The PSIPs are formed following a strategy mapping approach, starting from resources (inputs) and actions towards outcomes and impacts, based on (expected/proven) causal links. For each dimension (resources and actions, outcomes, and impacts) specific KPIs are set. Whereas the KPIs related to resources and actions mainly refer to managerial and organisational aspects, those related to outputs and impacts largely depict the expected short-, medium-, and longer-term results, although without necessarily being characterised as such. Notwithstanding, they can easily be turned into short-, medium-, and longer-term impacts in relation to science, the economy, and society. As a result, the PSIPs, as the basis for the partnership storyline, are the appropriate framework and do incorporate partnership-specific KPIs which can directly match many of the Horizon Europe KIPs' categories.

For example, some KPIs from the European Partnership for Photonics are presented along with the matching Horizon Europe KIPs.

68) Bruno, N. and Kadunc, M. 2019. Impact Pathways: Tracking and communicating the impact of the European Framework Programme for research and innovation. *Fteval Journal*. May 2019, Vol. 47, pp. 62-71. DOI: 10.22163/fteval.2019.330 https://repository.fteval.at/416/1/Journal_47_10.22163_fteval.2019.330.pdf

69) European Commission, Directorate-General for Research and Innovation, Carrozza, M., Romanainen, J., Amanatidou, E., et al., A robust and harmonised framework for reporting and monitoring European Partnerships in Horizon Europe: first interim report, Publications Office, 2021, <https://data.europa.eu/doi/10.2777/017792>

TABLE 8. Examples of partnership KPIs and related Horizon Europe KIPs (Photonics)⁷⁰

Examples of Photonics KPIs	Examples of relevant HE KIPs
<p>Next Generation Skillsets</p> <ul style="list-style-type: none"> ● Education, training, lifelong learning, attracting young people ● new curricula in main areas ● academic and non-academic ● Digi Hubs/cross-cutting and collaborative institutions 	<p>Skills</p> <ul style="list-style-type: none"> ● Number of researchers having benefitted from upskilling activities in FP projects (through training, mobility, and access to infrastructures)
<p>Examples of photonics-enabled digital transformation in critical industry value chains and applications</p> <p>Examples of photonics-enabled health and consumer applications and processes (e.g., autonomous driving, Point of care diagnosis et al)</p> <p>Examples of photonics-enabled applications, processes for an enhanced secure and safe digitisation (e.g. cyber security, zero-defect data collection, transport and analysis et al.)</p>	<p>Innovative outputs</p> <ul style="list-style-type: none"> ● Number of innovative products, processes or methods from FP (by type of innovation) and intellectual property rights (IPR) applications
<p>Contribution to missions and visions of the Horizon Europe programme objectives:</p> <ul style="list-style-type: none"> ● Green Deal ● Digital transformation ● Sustainable development ● Technological sovereignty 	<p>Outputs</p> <ul style="list-style-type: none"> ● Number and share of outputs aimed at addressing specific EU policy priorities (including meeting the SDGs) <p>R&I mission outputs</p> <ul style="list-style-type: none"> ● Outputs in specific R&I missions
<p>Set up collaborative deep-tech curricula in close cooperation with end-users</p>	<p>Co-creation</p> <ul style="list-style-type: none"> ● Number and share of FP projects where EU citizens and end-users contribute to the co-creation of R&I content
<p># of jobs created (planned to create) within the next three years</p>	<p>Supported employment</p> <ul style="list-style-type: none"> ● Number of full-time equivalent (FTE) jobs created, and jobs maintained in beneficiary entities for the FP project (by type of job)
<p>New systems and/or technologies developed in projects</p> <ul style="list-style-type: none"> ● # of spin-offs ● # of patents applied linked to projects ● # of new pilot lines ● # of new demonstrators 	<p>Innovative outputs</p> <ul style="list-style-type: none"> ● Number of innovative products, processes, or methods from FP (by type of innovation) and IPR applications <p>Innovations</p> <ul style="list-style-type: none"> ● Number of innovations from FP projects (by type of innovation) including from awarded IPRs.

70) The table includes a subset of KPIs from the full set of KPIs developed by photonics. They are not necessarily those included in the Partnership fiche (Chapter 4) which only covers 10 selected KPIs, mainly the new ones.

2.3.2 REPORTING ON PARTNERSHIP KPIS AND HORIZON EUROPE KIPS

The relevance of the partnership-specific KPIS and PSIPs to the Horizon Europe KIPs is clear. As a result, the data for the respective partnerships' KPIS – when the time is ripe for the partnerships to report on them – can complement those of the Horizon Europe KIPs that will be collected for all projects supported by Horizon Europe instruments and made available through the Horizon Europe dashboard. This is expected to pave the way for a more harmonised and robust monitoring of partnerships in the context of the expected impacts of Horizon Europe, as well as streamlining efforts.

Alternatively, data on the Horizon Europe KIPs can form the basis upon which the partnerships' performance partnerships-based on their projects' achievements, as reported through the KIPs – can be compared to those of other Horizon Europe instruments. Besides this direct comparison, such data can also inform the analysis on the additionality of the partnerships as a policy instrument vis-à-vis other Horizon instruments.

Nevertheless, the challenges faced by the Horizon Europe KIPs should also be considered. The definition of the time horizon (short term: at one year +, medium term: three years +, and long term: five years +) may not be appropriate for certain research fields like health, for instance. In addition, one of the most often reported challenges which evaluation exercises face is that of attribution. When the time is right to record medium- and longer-term impacts after the end of the project/intervention, the level of attribution of the results to the specific project/intervention falls drastically as a number of other factors and conditions may have affected the results (additional projects, enhanced strategy for collaboration, a national follow-up programme, etc.). Traceability of the beneficiaries is another major issue due to mobility. Reporting on KPIS as well as KIPs should always take such challenges into account.

It is also important to note that the Horizon Europe KIPs, being horizontally designed, do not capture the entire, specific value of the partnerships and their activities. Thus, any additionality analysis should include KIPs alongside partnership-specific KPIS and other monitoring and evaluation measures the partnerships design as relevant and appropriate to reflect their intervention logic and expected outcomes and impacts (PSIPs).

Furthermore, as the common indicators developed for European Partnerships (Chapter 2.4.) are largely input indicators, the Key Impact Pathway indicators can act as proxies to indicate whether increased inputs (e.g. commitments or synergies) lead to higher scientific outputs and the exploitation of knowledge.

2.3.3 SELECTED KEY IMPACT PATHWAYS FOR MONITORING EUROPEAN PARTNERSHIPS

A selected set of Horizon Europe KIPs which are closer to the partnerships' intervention logic (Figure 1) can be reported in the BMRs. The rationale for the selection of these KIPs is that:

- a focus on short-term, a limited number of mid-term and a couple of long-term indicators is pertinent to allow the effects and progress within the time framework relevant for the BMR cycle to be captured (2022, 2024, 2026, 2028); and
- the selected set should reflect the different types of impacts envisaged (scientific, economic, social) as well as the intervention logic of the design of the partnerships (Figure 13, Figure 16, Figure 20 and Figure 24).

As a result, the following KIPs have been chosen as of high relevance to the partnerships. Ideally, these should be monitored for the purposes of the BMRs, complementing the continued display of project data and analysis automatically generated on the Horizon Dashboard. At a later stage, when data for additional KIPs (medium and long term) become available, these should also be reconsidered to enable further analysis of the partnerships' contribution to the Horizon Europe KIPs. This should become possible for the BMRs planned from 2026.



SCIENTIFIC IMPACT

Publications – Number of FP peer-reviewed scientific publications (short-term) – considering the benchmark set based on H2020 data (Chapter 2.1) – and the Field-Weighted Citation Index of FP peer-reviewed publications (medium term)

This indicator reflects one of the most important outputs of partnership-supported projects: scientific publications. Based on H2020 data, the number of publications produced under projects supported by partnerships vary from 78 for EIT KICs, 6 819 for JU projects, and 2 807 for cPPPs projects (Chapter 2.1.4). These numbers may be used as a type of benchmark for the new partnerships under Horizon Europe, taking into account the differences in focus and scope across the different partnership types. At the same time, it is also important to report on the field-weighted citation index which denotes how important the research conducted by partnerships is and directly relates to the expected result of ‘Enhanced critical mass of interdisciplinary research across Europe’ in the intervention logic (Figure 1).

Number of researchers having benefitted from upskilling activities in FP projects (through training, mobility, and access to infrastructures) (short term)

Capacity building has always been an important focus of partnerships programmes and activities. This indicator reflects the attention paid to such activities and their outcomes which directly contribute to the expected result of ‘Enhanced critical mass’ but also ‘Enhanced performance of industrial research and industry’s ability to innovate’ of the intervention logic (Figure 1).

Share of FP beneficiaries having developed new transdisciplinary/trans-sectoral collaborations with users of their open FP R&I outputs (long term)

It is important to consider this long-term indicator as it reflects the significance of new collaborations across disciplines and sectors. This is relevant for the expected result of ‘More spill overs from industry and research to other knowledge users’ as well as the expected output of ‘Enhanced collaboration in R&I among all system actors’.

ECONOMIC/TECHNOLOGICAL IMPACT

Intellectual Property Rights applications (short term) – considering the benchmark set based on H2020 data (Chapter 2.1) – and the Number of innovations from FP projects (by type of innovation) including from awarded IPRs (medium term)

Based on H2020 data (Chapter 2.1.4), the number of IPR applications range from 64 in EIT KICs or 13 in cPPPs to 240 in JU projects. While these numbers may be used as a benchmark for the new partnerships under Horizon Europe corresponding to the short-term KIP economic/technological impact indicator, it is also important to monitor actual innovations being further developed/brought to the market (medium term).

Increase of FTE jobs in beneficiary entities following FP project (by type of job) (medium term)

Both these indicators directly relate to the ‘Enhanced performance of industrial research and industry’s ability to innovate’ of the expected results in the intervention logic and to the ‘Productivity gains and improvement of services thanks to a harnessing of capabilities, visions, and resources’. This also refers to the ‘Accelerated developments of innovative solutions’ of the expected outputs of the intervention logic and the ‘Strengthened evidence base for innovative solutions’.



Amount of public and private investment mobilised with the initial FP investment (medium term)

The third selected economic indicator relates to the ‘Enhanced potential for the uptake and large diffusion of innovative solutions’ of the expected results as well as to the ‘Expanded scale and systemic scope of public and private investment’ of the outputs.

SOCIETAL IMPACT

Number and share of innovations and scientific results addressing specific EU policy priorities (including meeting the SDGs) (medium term)

Results in specific R&I missions (medium term)

The two indicators above, besides directly reflecting a common indicator across partnerships (as explained in the following section), directly contribute to the ‘Strengthened integration of EU and national programmes’ of the expected outputs in the intervention logic’ and the ‘New and extended common SRIAs at EU level’ in jointly pursuing EU policy priorities and Horizon Europe Missions set.

Number and share of FP projects where EU citizens and end-users contribute to the co-creation of R&I content (short term)

This indicator contributes to the ‘Enhanced collaboration in R&I across all system actors’ of the outputs and the ‘More spill overs from industry to research and other knowledge users’ from the results in the intervention logic.

When it is possible to collect data, ideally, this subsection of future BMRs would report on the partnership performance through the selected KIPs, while an analysis between the partnerships’ results and those of Horizon Europe would also be useful, bearing in mind the different features, focus, and scales.

As noted above, when the collection of data for the long-term KIPs is possible, these should also be considered in the presentation and analysis.



2.4 MONITORING EUROPEAN PARTNERSHIPS USING COMMON INDICATORS

The purpose of this subchapter is to present and discuss evidence collected from the Horizon Europe partnerships through a Common Indicators Survey on the performance of the partnerships against the objectives set for them as a policy instrument. The analysis is further supported by anecdotal evidence collected from the interactively developed partnership fiches (see Chapter 4). Due to limited availability of data and early stage of partnership implementation, this first BMR focuses on a limited set of six common indicators highlighting partnership performance as regards the following objectives: additionality, directionality, transparency, openness, coherence, and synergies.

The first interim report of the Expert Group on support for the Strategic Coordinating Process for Partnerships⁷¹ proposed a set of common indicators that are complementary to the partnership-specific thematic indicators and KIPs (see Chapters 2.1 and 2.3). These common indicators on the functioning of European Partnership serve as a framework for the monitoring on how the new policy approach achieves its goals of stronger EU added value, directionality, additionality, synergies, increased transparency etc.⁷² The Horizon Europe's new approach to European Partnerships and the life-cycle criteria were the guiding light for the choice of common indicators (for the criteria framework see Chapter 1.1.2). The monitoring of common indicators is intended to be ambitious and able to capture as much of the added value of the partnerships as possible, with a minimum burden of data collection for the partnerships. The pilot survey conducted for this first BMR was the first attempt to build a coordinated monitoring framework for all partnerships on the functioning of the policy instrument in an aggregated way and to set a benchmark for partnerships.

The data used in this subchapter is a result of an interactive process and coordinated feedback from European Partnerships on the common indicators between February and November 2021 and was collected between November and December 2021. The common indicators complement the selected KIPs (presented in Chapter 2.3) in addressing the rest of the elements in the partnerships' intervention logic (Figure 1). In particular, the common indicators mainly reflect the total of the input aspects and certain aspects from the expected outputs, such as the 'New and/or extended SRIAs', the 'Strengthened integration of EU and national research programmes', the 'Expanded scale and systemic scope of public and private investment' and the 'Enhanced collaboration in R&I across all system actors'.

As each partnership has its own identity and orientation, the data for each indicator is gathered at the level of individual partnerships. Due to the heterogeneity of partnerships, their different starting points, different branches, and scientific fields, the focus of this subchapter is not to compare partnerships to each other. The rationale here is to provide an aggregate benchmark for later monitoring reports and to show some initial developments. To facilitate future BMRs, European Partnerships should integrate the common indicators in their monitoring systems and also present their progress on the common indicators in their individual annual activity or equivalent reports.

This first survey asked for the benchmarks and targets for each indicator. Since the data available was not complete, the second BMR will complete this task. Future surveys and BMRs will focus on progress reached at that point in time. In most cases, the starting point for setting benchmarks was the end point of both Horizon 2020 and the predecessor partnership. Where quantifying and aggregating were not feasible, qualitative evidence and examples from the country fiches (see Chapter 3) and the individual European Partnership reports (see Chapter 4) were used to complement the survey answers.

71) European Commission, Directorate-General for Research and Innovation, Carrozza, M., Romanainen, J., Amanatidou, E., et al., A robust and harmonised framework for reporting and monitoring European Partnerships in Horizon Europe: first interim report, Publications Office, 2021, <https://data.europa.eu/doi/10.2777/017792>

72) See monitoring and evaluation questions for future reports in "A robust and harmonised framework for reporting and monitoring European Partnerships in Horizon Europe" First interim report, p.22-23.

The common indicators are expected to be applicable for all types of partnerships. The pilot data-collection survey for this first BMR revealed that this was either not always the case or that sometimes a question was interpreted differently by the different types of partnerships. So, some adjustments should be made in view of the next BMR. Although the overall response rate on the survey was good at 84% (n=31 out of N=37)⁷³, it differed significantly between indicators. For example, in some cases, EIT KICs were not able to present benchmarks due to significant changes in the functioning of the KIC model in the new EIT Regulation and the Strategic Innovation Agenda 2021-2027.

This first biennial monitoring report focuses on presenting and analysing the following subset of 6 of the 11 common indicators:

- **Indicator #1** Progress towards (financial and in-kind) contributions from partners other than the Union - i.e. committed vs. actual contributions [direct leverage]
- **Indicator #3** Overall (public and private; in-kind and financial) investments mobilised into EU priorities (presented in Chapter 2.1, see Table 4)
- **Indicator #5** Measures ensuring continuous openness and transparency and dedicated activities
- **Indicator #6** Share of newcomer partners in partnerships, including geographical coverage
- **Indicator #8** Share of budget dedicated to coordinated and joint activities with other European Partnerships
- **Indicator #10** Share of complementary and cumulative funding from other Union or national/regional funds (national/regional, ERDF and other cohesion policy funds, RRF, CEF, DEP).

These indicators were selected because for them the quality and availability of data was sufficient, and the observations could be complemented with further and anecdotal evidence. The original list of 11 proposed common indicators is available in the Expert Group's first interim report⁷⁴. Issues related to data collection are further discussed in the Group's second interim report (forthcoming).

2.4.1 ADDITIONALITY AND DIRECTIONALITY

An important added value of European Partnerships derives from the additional private and/or public R&I investments in EU priorities (additionality) that can be translated into a leverage effect resulting from Union intervention. The alignment of these investments and contributions towards common objectives (directionality) and the achievement of impacts that cannot be created by other Horizon Europe or national actions alone is the main justification for using a partnership approach. The combined contributions (input) will mobilise additional investments (output) in support of the transitions and create long-term positive impacts on employment, the environment and society. This first report measures additionality with an input indicator #1 and it is understood as partnerships' financial and in-kind contributions partnerships (committed and actual). Future reports are also expected to report on the leverage once the first results from the completed projects and activities become available. For definitions of the terms 'Long-term financial commitment' and 'Leverage' see Box 10.

Previous evaluations – e.g. the Article 187 evaluation – point out that public-private partnership (PPP) activities need to be brought more in line with EU, national and regional policies. The directionality on EU priorities is measured with indicator #3 and presented in Chapter 2.1 along with an additional qualitative analysis of the PSIPs. Coherence and synergies linked to the common indicator #10 are discussed in Chapter 2.4.3.

73) Only Partnerships that have already started were included in the survey.

74) European Commission, Directorate-General for Research and Innovation, Carrozza, M., Romanainen, J., Amanatidou, E., et al., A robust and harmonised framework for reporting and monitoring European Partnerships in Horizon Europe: first interim report, Publications Office, 2021, <https://data.europa.eu/doi/10.2777/017792>, p. 29.

BOX 10. COMMISSION DEFINITIONS⁷⁶ ON LEVERAGE EFFECT AND LONG-TERM FINANCIAL COMMITMENT

‘Long-term financial commitment: The long-term financial commitment of participating countries and/or industry and other stakeholders is a precondition for considering the establishment of a European Partnership. The commitment should be clear from the outset and ensured during the lifetime of the partnership, including beyond Union support, where appropriate. The endured commitment over the lifecycle of the European Partnership, including adequate human resources, is a core indicator for ensuring its relevance. The potential combination of cash and in-kind contributions has to be defined individually per partnership and requires appropriate and transparent calculation methodologies across the different partnership approaches.’

‘Leverage: The leverage effect of R&I partnerships has both a quantitative and qualitative dimension. The quantitative dimension describes the additional investments triggered by the partnerships and the corresponding leverage effect the EU co-funding creates for exploiting or scaling-up results (financial additionality). The quantitative leverage effect needs to be reported on the basis of a harmonised calculation methodology. The qualitative dimension describes the wider impacts according to its intervention logic.’

Indicator #1 Progress towards (financial and in-kind) contributions from partners other than the Union - i.e. committed vs. actual contributions [direct leverage]

Indicator #1 shows the percentage of contributions achieved out of the total commitments made by the partners other than the EU at the beginning of the partnership. The benchmark is calculated as a percentage of actual contributions compared to those committed. The target value is presented in absolute terms because this is an estimate of the committed contributions. The share of committed to actual contributions may be calculated at the end of the partnership (to validate whether or not the targets were reached).

TABLE 9. Progress towards translating commitments from non-Union partners to actual contributions

Partnership type	Benchmark: How much of the commitment for the predecessor partnership under Horizon 2020 was turned into actual contributions?	Target: How much have the partners other than the Union committed to this partnership for its whole duration [EUR m]?
Institutionalised based on Arts. 185 and 187 of the TFEU	94% ⁷⁶ n/N: 11/11 Min: 0% Max: 291%	18 131 ⁷⁷ n/N: 16/19 Average: 1 133 Min: 62 Max: 3 981
Co-funded	69% ⁷⁸ n/N: 5/8 Min: 0% Max: 100%	2 166 ⁷⁵ n/N: 6/8 Average: 361 Min: 200 Max: 700
Co-programmed	Not applicable	11 080 ⁷⁵ n/N: 11/11 Average: 1 007 Min: 340 Max: 3 300

Source: Common Indicators Survey, November 2021. Indicator #1

75) Draft criteria Framework for European Partnerships under Horizon Europe (ERAC, 2018): <https://www.era-learn.eu/documents/wk-14470-2018-init-en.pdf> (p. 4).

76) Average of answers (7 EIT KICs excluded).

77) Sum of answers.

78) Average of answers.



All institutionalised partnerships except for EIT KICs provided benchmark data for this indicator and 84% target data. Co-funded partnerships had lower but still good response rates of 63% and 75%. Co-programmed partnerships responded 100% to the target question. The benchmark question was excluded from them because the question is not applicable: no ex-ante commitments were required under H2020. EIT KICs also struggled to present benchmarks due to the changed concept of contributions for the KICs under the new EIT Regulation⁷⁹.

Significant heterogeneity can be observed between the individual partnerships for indicator #1. The largest sums are targeted for partnerships in the transport, energy and high-tech sectors. The target value of total commitments from partners other than the Union amounts to EUR 26.4 billion (all types of partnerships). This survey data matches the EUR 31.3 billion committed by partners other than the EU at the beginning of Horizon Europe (see key figures in Chapter 1). These commitments show the additionality to the budget committed by the European Commission in Horizon Europe to date. Continuous monitoring of this indicator in the coming years will be important to check if the committed contributions will turn into actual contributions and reach the overall additionality goal. This is important as the Union contribution must at least be matched by members other than the EU (co-programmed and institutionalised partnerships) and, in the case of European Partnerships, rises to 70% in most cases.

While it is too early to show qualitative leverage under Horizon Europe, there are some examples from H2020 – e.g. Box 11 shows how additional resources were mobilised in Bulgaria to acquire a large-scale computer in the context of the EuroHPC JU.

BOX 11. EXAMPLE OF ADDITIONALITY: THE BULGARIAN PETASCALE SUPERCOMPUTER

‘Bulgarian participation in EuroHPC JU, despite challenges of the national budgeting and coordination processes related to European Partnerships, can be seen as a success story. The Bulgarian petascale supercomputer, among the five petascale supercomputers that were developed with support from EuroHPC (35% of the procurement was funded by the EU), leveraged significant national resources and high-level political engagement. The supercomputer, named Discoverer, currently ranks 91st among the global top 500.

The project is implemented by the consortium Petascale Supercomputer Bulgaria, which consists of Sofia Tech Park JSC, the association National Center for Computer Applications, and the Strategic Center for Artificial Intelligence. The supercomputer itself was delivered by Atos.

Discoverer was officially inaugurated on 21 October 2021.’

Source: Bulgaria country fiche (see Chapter 3)

Indicator #3 Overall (public and private; in-kind and financial) investments mobilised into EU priorities is presented and discussed in Chapter 2.1.

⁷⁹) Regulation (EU) 2021/819.

2.4.2 TRANSPARENCY AND OPENNESS

Transparency and openness are central criteria for European Partnerships new approach to meet the goal of an integrated European research landscape. Under Horizon Europe, all European Partnerships should aspire to be open and serve the interests of all relevant stakeholders. A partnership can maximise its impacts by involving all relevant partners and stakeholders beyond the narrow composition of core partners and by remaining open throughout its lifetime. European Partnerships are expected to adopt measures to promote the participation of newcomers and to remove barriers that hinder them from joining the partnership or participating in its activities. Moreover, partnerships should have transparent processes for consulting all relevant stakeholders in their agenda-setting and ensure broad communication and dissemination of information on calls, results and partnership activities.

The Horizon 2020 interim evaluation pointed out several issues with partnerships' openness towards new members and project participants across the value chain and EU countries, highlighting the risk of closed clubs. Smaller actors and R&D-less-intensive countries and regions often do not have the necessary (human) resources to participate on equal terms⁸⁰. This is a barrier for more optimal and inclusive participation of all types of stakeholders, favouring rather closed incumbent networks from a limited number of countries and hampering the diffusion of knowledge across borders, sectors, disciplines and along the value chain⁸¹.

At the same time, 18% of PPP and 23% of cPPP funding go to SMEs, which shows that, on average, those partnerships are more successful at attracting SMEs than H2020. Of course, there are differences with regard to the sectors/individual partnerships and additional analysis could provide further insights. A recent ERA-LEARN study observed a growing involvement of 'widening countries'⁸² in leading programme activities, although much greater improvement is needed (currently only Poland and Portugal coordinate programmes, one each)⁸³.

Over 35 international partner countries have participated in public-public partnerships and Joint Programming Initiatives in Horizon 2020, such as the Partnership for Research and Innovation in the Mediterranean Area (PRIMA), Water JPI, and EDCDP 2. JPI Urban Europe had two international calls (ERA-NET SUGI and a non-co-funded call with China. Another call with China is under preparation as part of EN-UAC⁸⁴. Although these countries are not full members of JPI Urban Europe, the programme has always been open for international cooperation in joint calls. New partnerships will reinforce international cooperation through, for example, the Global Health EDCTP3 partnership, Water4All and Biodiversity partnerships.

80) https://www.kowi.de/Portaldata/2/Resources/horizon2020/H2020-cPPP-mid-term-evaluation-report_.pdf, p. 16.

81) Impact assessment of Horizon Europe, Commission Staff Working Document, SWD(2018)307. <https://ec.europa.eu/transparency/regdoc/index.cfm?fuseaction=list&n=10&adv=0&cotelid=10102&year=2018&number=307&dateFrom=&dateTo=&serviceId=&documentType=&title=&titleLanguage=&titleSearch=EXACT&sortBy=NUMBER&sortOrder=DESC>, Annex 1.

82) Countries that are low performing in the area of R&I (70% of the EU average) are considered to be widening countries. More information can be found at https://ncpwidenet.eu/wp-content/uploads/2021/06/From_Horizon_2020_to_Horizon_Europe_Changes_in_Widening_countries.pdf

83) ERA-LEARN report 'Inclusiveness in European R&I Partnership Programme', p. 10.

84) <https://www.era-learn.eu/network-information/networks/en-uac>



BOX 12. DIFFERENT CHALLENGES FOR OPENNESS FOR THE THREE TYPES OF PARTNERSHIPS

Co-funded:

- Countries (i.e. their national/regional funding bodies) have to participate in the partnership for its stakeholders to apply to calls.
- Traditionally also not very open to SMEs or cities due to national funding rules, but there is a growing desire to open up.

Co-programmed:

- Characterised by large memberships (an association membership can vary from 100 to 3 000, depending on the industry sector).
- More MS involvement is needed – Member States and partnerships largely target the same challenges and good coordination is important to ensure complementarities (see H2020 evaluation).

A187:

- Past problems were ring-fenced calls (discontinued under HE).
- Little involvement of broader stakeholders across the value chain, end-users and regulators, beyond the JU members (impact assessment study).
- Lack of access to results and little dissemination.

Some challenges have already been addressed during the policy design phase of the European Partnerships – e.g. the requirement to have measures to attract newcomers, as well as a public consultation on the SRIA and the consistent use of States Representatives Group or equivalent in the case of industry partnerships. These measures are expected to improve the situation considerably during Horizon Europe.

Indicator #5 Measures ensuring continuous openness and transparency and dedicated activities

This is a qualitative indicator. These measures should be described and assessed in terms of how open, transparent, and inclusive they are in addressing various types of stakeholders and countries. The survey questions were:

Do you have measures in place for a transparent and open involvement of stakeholders and all EU and Associated Countries, and for attracting newcomers?

All partnerships that answered had measures in place for the transparent and open involvement of stakeholders, all the EU, and Associated Countries, and for attracting newcomers.

What are the most important planned measures for involving various types of stakeholders and countries and the progress you expect from these measures? (max. two statements)

Most partnerships have planned measures for involving various types of stakeholders and countries. Reoccurring planned measures for several partnerships were stakeholder fora, open events, open calls, and activities in new countries. The partnerships could describe in detail external networks, communication plans, and even technical workshops, mini-conferences, and publications. There are no obvious differences between clusters (1, 4, 5) when it comes to describing networks and national hubs of stakeholders and experts. EIT KICs mentioned small companies, students, and society to a greater extent.



The survey responses indicate that co-funded partnerships intend to increase synergies and cooperation especially with national and regional authorities and Member States. They also plan to involve more relevant stakeholders and new partners via more co-creation and collaborations. A special challenge for co-funded partnerships was to engage and involve national and regional stakeholders with very heterogeneous capacities and needs. Also, the diverse innovation regimes at national and regional level have to be integrated, which is a complex task. Several co-funded partnerships replied that the involvement of small and medium-sized enterprises (SMEs) is still a challenge for them.

According to the survey answers, co-programmed partnerships plan a lot of different forms of participation activities for stakeholders. These range from workshops, hubs, platforms, plenary meetings to stakeholder fora. Co-programmed partnerships also seem to place special emphasis on additional communication activities, and face very diverse challenges, including fragmentation, complexity, and scarce resources.

Institutionalised partnerships plan to increase their stakeholder involvement through stakeholder fora and other types of interaction. They intend to launch open calls and increase their communication activities. Institutionalised partnerships face different challenges, but the one mentioned most often is limited resources.

The survey answers do not allow for any general conclusions to be drawn on the challenges faced and measures taken by the different partnership types. Some activities occur in all types such as more stakeholder involvement through workshops and other meetings. Nevertheless, the description in the previous paragraph shows that the different types of partnerships address the challenges mentioned in Box 12. Based on their responses to the Common Indicators Survey, co-funded partnerships seem particularly aware of the need to involve Member States more than under Horizon 2020. Co-programmed also increase their efforts to address the fragmentation and significant heterogeneity of stakeholders and potential partners. Institutionalised partnerships plan to increase the openness of their calls, which is also an obligation in the Single Basic Act that establishes Joint Undertakings under Horizon Europe⁸⁵.

BOX 13. BUILT4PEOPLE: THE PARTNERSHIP STAKEHOLDER FORUM (CO-PROGRAMMED PARTNERSHIP)

‘The Partnership Built4People Stakeholder Forum, with broad involvement (all stakeholders from the construction value chain, related sectors, and end-users, as well as those Member States demonstrating an interest in the partnership area and vision) will be informed on a regular basis (via different media channels) and through at least one plenary meeting each year about the partnership’s state of play and progress. This forum will also have the capacity to advise at strategic and operational level and support informed decision-making. Alongside Built4People innovation clusters, the forum will be an instrument to collect and provide regular information regarding market trends and evolution, challenges, and barriers, allowing for the refining and updating of estimates of impact and additional investments to be deployed, fine-tuning the partnership’s KPIs and supporting their monitoring, etc.’

Source: Common Indicators Survey, November 2021.

85) Council Regulation (EU) 2021/2085.

BOX 14. WATER4ALL STAKEHOLDERS ENGAGEMENT (CO-FUNDED PARTNERSHIP)

'Stakeholders engagement starts from the development of the Strategic Research & Innovation Agenda (SRIA). A public consultation was run online in winter 2020-2021 to collect feedback on the draft SRIA from any source. Additional interviews with stakeholders are being carried out in the process of finalising the 1st version of the SRIA. The agenda will be reviewed halfway through the partnership, and again stakeholders' engagement will be sought through a series of (hopefully physical) workshops. The workshops will target various categories of actors (research operators, water associations, clusters, policy and management...) to collect broad, complementary and inclusive views.

In addition, the advisory boards of the partnership will include a stakeholders' board, where up to 12 entities will bring advice and input on a regular basis to the governing bodies of the partnership for planning the activities, directing the efforts and monitoring the progress. The composition of this board will seek a balance between various categories of stakeholders, including NGOs.'

Source: Common Indicators Survey, November 2021.

BOX 15. SMART AND NETWORK SERVICES (SNS) DISSEMINATION ACTIVITIES (INSTITUTIONALISED PARTNERSHIP)

The 6G-IA is open for all that have research activities in Europe. The association has already performed extensive dissemination in Conferences, Workshops, other events to inform the communities about SNS and the 6G-IA. These events have been organised at the European, national and regional level. In addition, we have explicit MoUs with other key organisations and already communication links with other Partnerships. We have also had presentations and iterations with the Member States for the SNS WP.

Source: Common Indicators Survey, November 2021.

What are the most important challenges for setting up or implementing such measures/ procedures? (max. two statements)

All 29 partnerships responding to indicator #5 questions had also defined important challenges for setting up or implementing such measures or procedures. While these vary across the partnerships, at least three partnerships mentioned the following categories of challenges:

- ecosystems currently fragmented for various legitimate reasons
- absence of national/regional funding support programmes for certain regions and research areas
- lack of national attention and national research network
- lack of resources
- conflict of interests
- large number of participants, and
- maintaining the existing network while outreaching to new members.



BOX 16. PARTNERSHIP FOR RISK ASSESSMENT OF CHEMICALS (PARC): STAKEHOLDER FORUM CHALLENGE (CO-FUNDED PARTNERSHIP)

‘For the Stakeholder Forum, a key challenge will be to ensure that it has a good representative balance between stakeholders. Indeed, to ensure that the Stakeholder Forum can remain efficient and manageable, the number of participating organisations will be limited. However, not all stakeholders have access to the same resources; private stakeholders and NGOs may not have access to the same resources to actively contribute to PARC. In the same vein, the wide scope of activities in PARC will make challenging to identify the most appropriate and representative stakeholders.’

Source: Common Indicators Survey, November 2021.

BOX 17. WATER4ALL CHALLENGE OF PREVENTING CONFLICTS OF INTEREST (CO-FUNDED PARTNERSHIP)

‘The other main concern for stakeholders’ involvement and newcomers’ integration is the prevention of conflicts of interest. For preventing this, we decided not to have any private company in the consortium (except one affiliated entity to a public agency). Still, we have to prevent the conflicts of interest for the research organisations and other stakeholders, as their involvement in the design of the strategic agenda and in the operational planning should not create a conflict in the actual implementation. We therefore have to be cautious about the role of each one in the planning part, with respect to the potential role in the implementation. The same care should be taken when discussing the integration of additional partners.’

Source: Common Indicators Survey, November 2021.

BOX 18. 2ZERO CHALLENGE OF INVOLVEMENT OF SMES (CO-PROGRAMMED PARTNERSHIP)

‘Despite our efforts to raise awareness of the partnership opportunities and activities, and the interest expressed by most stakeholders with whom we interact, some of them do not have the capacity to contribute more actively than what they are doing already today.’

This is in particular the case for SMEs who are expressing high interest in the benefits of the partnership, but rarely turn their interest into actual active participation in the partnership and related association, for various reasons (human resources, financial capacities, preference for national funding schemes ...).’

Source: Common Indicators Survey, November 2021.

BOX 19. BUILT4PEOPLE CHALLENGE OF FRAGMENTATION (CO-PROGRAMMED PARTNERSHIP)

‘Innovation clusters: The partnership Built4People sector is fragmented and has, traditionally, a wide range of stakeholders. Built4People has a holistic perspective aiming to a larger pool of stakeholders beyond the traditional ones in order to contribute to the achievement of the twin-transition targets. Therefore, the setting up of these cluster might encounter challenges on balancing the composition of these and connect to the cluster change makers and innovation pull.’

Source: Common Indicators Survey, November 2021.



Indicator #6 Share of newcomer partners in partnerships, including geographical coverage

This indicator covers newcomer partners as a percentage of total partners⁸⁶. Newcomer partners are those organisations that are partners in the current partnership but have never been a partner in this partnership or its predecessor(s). Because of data gaps in the survey responses, only data on the geographical coverage of potential newcomer countries can be presented. See the partnership fiches in Chapter 4 for information on the types of partners and their geographical coverage at the beginning of Horizon Europe, for which data was also collected through the Common Indicators Survey.

How many newcomer partners do you target to have in your partnership?

Data on different types of newcomer partners (e.g. university, SME, etc.) that might be targeted during the partnership was requested from the partnerships. However, the responses received were not sufficiently complete to enable proper aggregation or concrete conclusions.

The only evidence available to address this issue in this report is anecdotal concerning the partnerships' efforts to reach out to newcomer partners gathered from the partnership fiches (Box 20, Box 21, and Chapter 4).

BOX 20. PHOTONICS EXAMPLE - SUPPORTING PHOTONICS SMES

'The Photonics partnership will foster synergies with Photon Hub, a pan-European initiative bringing together more than 500 photonics experts from 15 Member States with the aim of supporting companies regarding photonics orienteering, training and reskilling, deep technology innovation support, business and investment coaching, as well as guidance to regional support.

Furthermore, the Photonics partnership will encourage photonics start-ups to participate in the newly established activities of the European Innovation Council and will advise them of financing opportunities and actively promote their participation in investment events. Access to venture capital for photonics start-ups and entrepreneurs will be created by holding an annual European Photonics Venture Forum. The Photonics partnership will also help to generate potential leads for the EIB to invest in photonics, furthering access to capital for SMEs in the later growth phase.'

Source: partnership fiches

BOX 21. CLEAN HYDROGEN ON HYDROGEN VALLEYS FOR OPENNESS

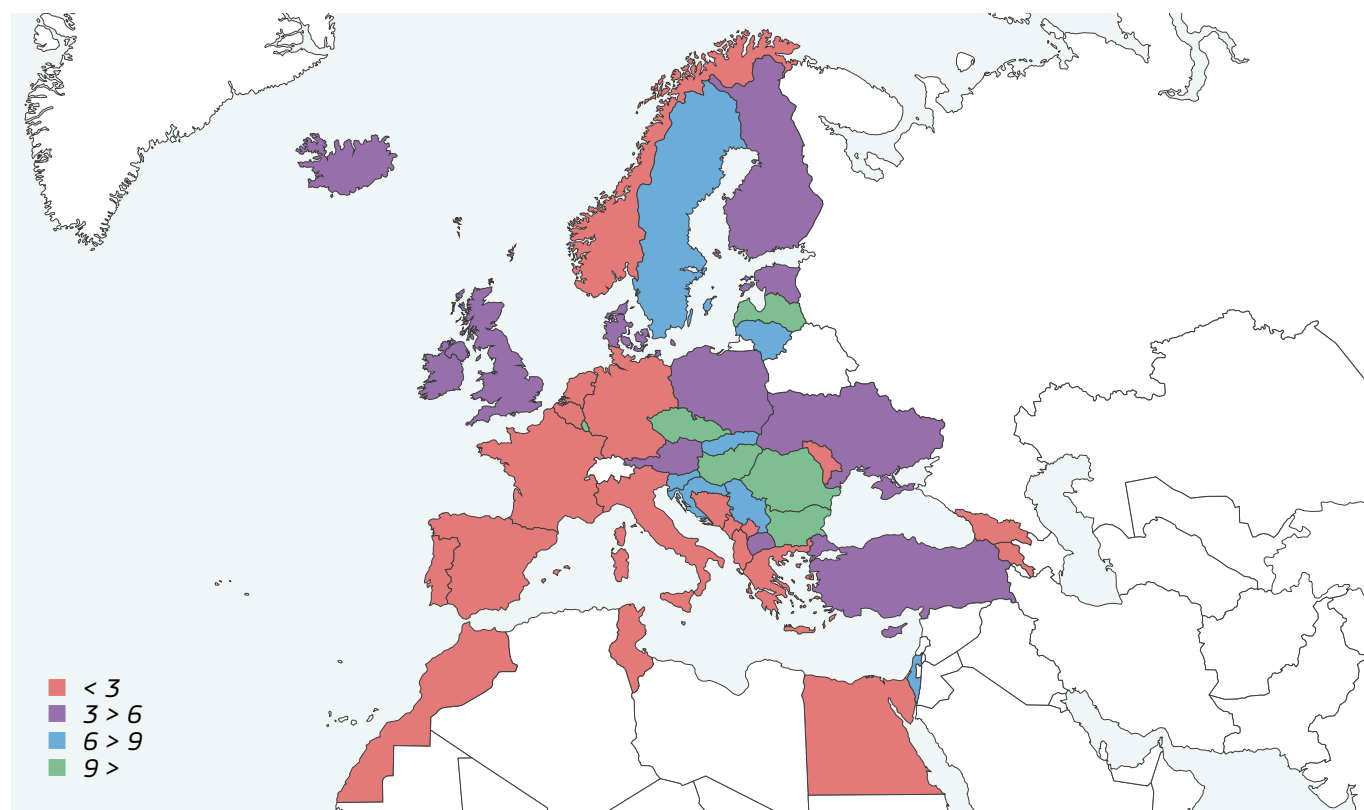
'Since 2014, FCH JU (the predecessor of Clean Hydrogen JU) has pursued the concept of hydrogen valleys, a defined geographical area where several hydrogen applications are combined and integrated within an FCH ecosystem. Hydrogen valleys are the most synergetic type of projects, involving different types of stakeholders (public and private partners, large companies and SMEs, private companies, and research institutions). They often combine various sources of funding: private, national, regional and EU funding streams, of which the JU funding is just a small share. Prime examples of these hydrogen valleys are the three recent projects of FCH JU: HEAVENN, Green Hysland and BIGHIT. The Clean Hydrogen JU will continue to support hydrogen valleys as one of its main activities.'

Source: partnership fiches

86) Partners are understood as meaning members of the JU/Grant Agreement establishing a Co-funded European Partnership or members of the associations representing the private partners in the co-programmed Partnerships or JUs.

What newcomer countries (both EU and non-EU) do you target to add into your partnership as partners?

FIGURE 29: Geographical coverage of targeted newcomer partners (aggregated data for all European Partnerships that responded to the survey)



Source: Common Indicators Survey (after cleaning the data, 21 of 34 answers were included on this map; only countries in Europe and Africa are displayed to make the map more readable).

The Common Indicators Survey asked about European Partnerships' intentions regarding targeting newcomer partners per country. Even though the data is not complete and only gives a rough picture⁸⁷, in Figure 29, we observe a strong intention to reach out to widening countries in Europe. Hungary, Bulgaria, Latvia and Luxembourg were mentioned by 10 or more partnerships as potential newcomer partner countries. Outside the EU, Norway and Israel were mentioned most often. In addition, some African countries and some partnerships (not included in the map) also included Brazil, Canada, China, Chile, India and the USA in the answer boxes. It is important to note that the replies give an indication of intention and possible focus for partnerships' outreach measures in the coming years, although their materialisation also depends on the willingness of the countries or their stakeholders to join and contribute.

Besides newcomer countries, European Partnerships have broadened the range of actors involved across the value chain – either as direct members or in the governance processes. For example, the Smart Networks and Services JU has expanded its membership compared to its predecessor (5G cPPP) to include communities from the Internet of Things and cloud domain. Moreover, in 2020, the three JUs with traditionally consolidated sectors (rail, aviation, and air traffic management) organised open calls for expression of interest for new members to stimulate the participation of newcomers⁸⁸.

87) For some of the partnerships, it was too early to give valid answers and targets on future partners. For others, there were some definition problems with this indicator, notably what was meant by a 'partner' or the role a Partnership can play in 'targeting' certain countries as the process of joining is a matter of mutual interest, opportunities, etc.

88) E.g. https://ec.europa.eu/info/news/new-call-ideas-clean-aviation-Partnerships-2020-aug-26_en. Also, in September 2021, DG MOVE organised an information session for air-traffic-management stakeholders, introducing the possibility to become a member.



The country fiches (see Chapter 3.3) indicate that many Member States are improving pre-conditions to support the openness and transparency of networks (participation, access and funding) and to actively encourage new partners (project partners, but also new funding organisations) to join partnerships or their related projects. The country fiches state that partnerships (e.g. ERA-NETs from previous funding periods) are seen as important door openers and entry points to international cooperation. This has also been mentioned by different EU countries (irrespective of their geography or size) in previous discussions in partnership-related discussion groups.

Previous successful participation in partnerships in different countries has supported the engagement of new funding organisations (see Box 22 for the example of Estonia).

BOX 22. THE EXAMPLE OF ESTONIA

‘During Horizon 2020, the ministries’ capacity to determine the R&D needs of society has improved considerably due to the active involvement in partnerships’ strategic planning on the national level. In Horizon Europe, six ministries have committed to supporting participation in partnerships with EUR 27 million and ensuring the complementarity of national policy goals with global societal challenges.’

Source: Estonia’s country fiche

Some country fiches mention that the national partnerships mirror groups created during Horizon 2020 have proven to be effective in engaging new stakeholders at the national level (i.e. new potential participants and new funding organisations) and in providing high-quality feedback already in the programming phase. Therefore, national mirror groups can be important support mechanisms for the greater involvement of different actors, greater programming transparency among partnerships and potentially can also be beneficial to partnership-related coordination and monitoring systems. Even though not all countries have established national-level mirror groups, it would seem highly recommended to do so. Some countries are planning to establish such groups for the new EU partnerships, as closer dialogue and greater involvement among different stakeholders is desired.

In addition, a strong and effective national coordination process could potentially support these indicators: for example, one country mentions a plan to ‘establish an adequate coordination mechanism between sectoral ministries and industry stakeholders’, while another explains: ‘revisions in national coordination and changed national co-funding allows additional new partners to participate in partnership’s related projects (e.g. SMEs, regional authorities). The aim was to align the national co-funding rules with overall Horizon Europe principles (to engage more different types of participants in the programme).’

Overall, even with the data gaps for indicators #5 and #6, a broad awareness for improving measures on openness and transparency can be observed. In addition, the evidence collected under indicator #6 shows approaches to target more widening countries and SMEs. The responses point out that there are still challenges in the field of openness and transparency, but the new European Partnerships and the Member States intend to address these through different channels and measures, which will have to be monitored.



2.4.3 COHERENCE AND SYNERGIES

The new impact-oriented approach expects European Partnerships to take a more systemic approach to achieving the objectives. In particular, partnerships should not act in isolation but in the broader landscape of R&I and sectoral policies by seeking and exploiting synergies with related Horizon Europe and other initiatives at the EU or national level, including with the EU Missions.

While an assessment of the coherence of the partnership portfolio goes beyond the scope of monitoring, this report aims to provide a benchmark for assessing whether or not the intentions to collaborate with other initiatives were attained.

Indicator #8 Share of budget dedicated to coordinated and joint activities with other European Partnerships

This indicator covers the percentage of a partnership's budget dedicated to coordinated and joint activities with other European Partnerships:

Share of budget dedicated to coordinated and joint activities with other European Partnerships

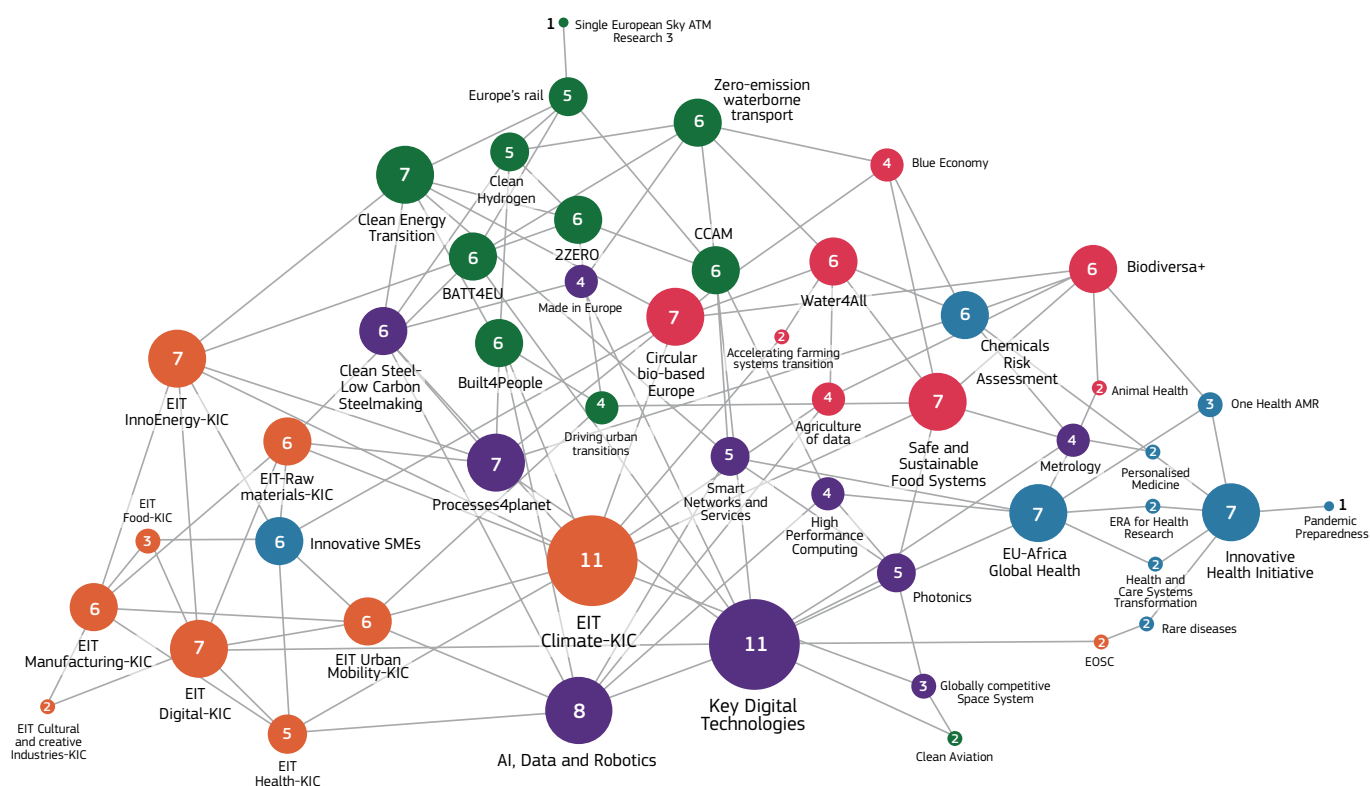
The values from the survey data were difficult to interpret as, for example, in some cases, many or all other partnerships were selected. The quantification of budget shares is understandably difficult to allocate or even estimate in this early phase. Consequently, the report only presents the planned cooperation between the European Partnerships and no numbers on the budgets.

The horizontal partnerships have a central position in the overall portfolio as they are expected to develop methodologies and technologies for application in other priority areas, ultimately supporting European strategic autonomy in these areas as well as technological sovereignty. These horizontal partnerships are typically proposed as institutionalised or co-programmed partnerships, in addition to a number of EIT KICs. They mainly cover the digital field in addition to space, creative industries and manufacturing, but also the initiative related to innovative SMEs. Vertical partnerships focus on the needs and development of specific application areas and are primarily expected to support enhanced environmental sustainability, thereby addressing the European Green Deal-related objectives⁸⁹.

The network graph in Figure 30 shows the importance of cross-cutting topics like climate and digital issues for collaborations and synergies within the European Partnerships landscape. From the 31 partnerships which responded, the biggest nodes with the largest numbers of planned coordinated and joint activities with other European Partnerships show EIT Climate-KIC and AI, Data and Robotics. The survey indicates a good awareness of the need for alignments, synergies, and coherence between the European Partnerships and across different clusters.

89) See Impact Assessment 2_EN_impact_assessment_part3_v3.pdf (cdep.ro)

FIGURE 30. Planned coordinated and joint activities between the European Partnerships



Source: common indicators survey, November 2021. Cluster 1 – blue, Cluster 4 – violet, Cluster 5 – green, Cluster 6 – red, Cross-pillar – orange

The impact assessment study highlighted the importance of the Commission services' role in enhancing synergies, collaboration and bridging gaps between the different partnerships (pp. 217). A good example of such efforts is the development of the Clean Planet Inter-Partnership Assembly (see Box 23).

In addition, the partnership fiches in Chapter 4 include some good examples of how the individual partnerships approach synergies and coherence with other European Partnerships (see e.g. Box 24 and Box 25).



BOX 23. CLEAN PLANET INTER-PARTNERSHIP ASSEMBLY – AN EXAMPLE OF FOSTERING COOPERATION BETWEEN EUROPEAN PARTNERSHIPS

The **Inter-Partnership Assembly**, launched in December 2020 by the European Commission, has the main objective to harmonise and align the multi annual work programmes of the different partnerships (and of the collaborative parts in Horizon Europe), as well as stimulate synergies between initiatives (e.g., topics in the work programmes and also relevant project results).

Proposals for joint or coordinated research/innovation topics are being discussed across the different partnerships, in particular around hydrogen/electrification/manufacturing and IT technologies (being common enabling technologies serving all the other industrial sectors) as drivers for climate-neutral technologies in multiple industrial sectors. Potential coordinated calls should be in line with KPIs, which ideally should be fully aligned across the partnerships.

While the Inter-Partnerships Assembly had initially the focus on synergies between Partnerships in Cluster 5 (in particular to link the use of hydrogen technologies with applications), the Assembly scope has evolved in order to exploit synergies across Horizon Europe, in particular Clusters 4 and 5. Examples include:

- Electrification technologies (2Zero, Rail, Waterborne, Clean Aviation, ... and Batt4EU)
- Cities and built environment: CETP (Co-Fund on Clean Energy Transition), DUT (Co-fund on Driving Urban Transition), CCAM, B4P (co-programmed PP on building environment) and Cities Mission.
- digital technologies (e.g., HPC, SNS, KDT, Artificial Intelligence and Photonics and other sectoral Partnerships in energy, transport, health, construction, agriculture, etc...)
- Manufacturing/Process technologies (Made in Europe/European Metrology/ P4Planet and other sectoral Partnerships in energy, transport, health, construction, agriculture, etc...).

Source: European Commission

BOX 24. CLEAN HYDROGEN COLLABORATION WITH OTHER EUROPEAN PARTNERSHIPS

'The Clean Hydrogen JU aims to establish structured collaboration with many other European Partnerships, since hydrogen can be deployed as a fuel, energy carrier and for storing energy. Towards this goal, the Clean Hydrogen JU in close cooperation with other end-use partnerships, developed common roadmaps, aiming to better coordinate the planned activities per partnership in the context of R&D in hydrogen technologies. This common planning aims to prevent overlaps, enable synergies and lead to more visible impacts of hydrogen technologies in the context of the Horizon Europe Programme.'

Source: partnership fiches

BOX 25. DRIVING URBAN TRANSITIONS (DUT) COLLABORATION WITH OTHER EUROPEAN PARTNERSHIPS

'Focusing on the complexity of urban transformation, JPI Urban Europe (and DUT) offer manifold entry points for cooperation with sectoral oriented initiatives and partnerships. Over the last years co-operation with the nine other joint programming initiatives has taken place to regularly develop common positions and organise joint events, e.g. JPI Urban Europe organised, in cooperation with all JPIs, the conference 10 years Joint Programming in 2018. Joint workshops with FACCE, Water JPI or JPI Climate allowed the identifying of common issues and the alignment of agendas. Dialogues were established with CETP, Biodiversa, EIT Urban Mobility or Food Systems to exchange on strategic issues and priorities.'

Source: partnership fiches



Indicator #10 Share of complementary and cumulative funding from other Union or national/regional funds (national/regional, ERDF and other cohesion policy funds, RRF, CEF, DEP)

The indicator asked for complementary and cumulative funding from other EU or national funds as a percentage of the total partnership budget. The survey database is too incomplete to analyse this indicator properly. The reasons for this are a lack of data at partnership level for all types of partnerships. In particular, targets for these seem not to have been sufficiently discussed, so the partnerships struggled to answer this question quantitatively. Nevertheless, good anecdotal evidence from the partnership fiches in Chapter 4 is available. Two examples from partnership fiches for Photonics and Clean Aviation show a significant effort to create synergies with other programmes and national policies (see Box 26 and Box 27).

BOX 26. PHOTONICS SYNERGIES WITH NATIONAL AND REGIONAL POLICIES

‘Fostering synergies with the National and Regional Advisory Board (former Mirror Group): The efficient coordination of photonics investment and public initiatives at the European, national and regional level is a major challenge for Europe and has so far been insufficiently successful. At the Member State level, the partnership had already established the Photonics21 Mirror Group, which is made up of representatives of national ministries coordinating national priorities and investments in photonics. As a result of this activity, five joint transnational photonics calls on different photonics subjects have been implemented under the ERANET co-funded partnership and the EUREKA programme scheme. The partnership will now take this activity to the next level to trigger new joint cross-Member State calls in photonics, and to enable a close alignment with Horizon Europe’s Photonics partnership investments and an efficient preparation and coordination of new joint calls.’

Source: partnership fiches

BOX 27. CLEAN AVIATION SYNERGIES WITH NATIONAL AND REGIONAL POLICIES

‘Clean Sky 2 has developed synergies with the regions and European Structural Investment Funds (ESIF) through Memorandum of Understandings (MoUs) with national and regional authorities aligning objectives with regional strategies and Regional Strategy for Research and Innovation for Smart Specialisation (RIS3). Eighteen MoUs have been signed with Member States/regions, and twelve Clean Sky Synergy Labels have been awarded to complementary activities. More than fifty projects have been supported by ESIF with a budget above EUR 50 million.

The Clean Aviation JU (CAJU) will also develop synergies with national and regional authorities on the basis of the RIS3 and utilising the European Regional Development Fund (ERDF) Operational Programmes in place or under preparation for 2021–2028. At least EUR 100 million plus involving the top 30–40 regions with relevant RIS3 will be targeted. The CAJU plans to develop an innovation architecture spanning the major national R&I programmes in Member States and Associated Countries. Participation by national authorities will be by mutual agreement and based on the significance of the national efforts and budget available and the commitment to align roadmaps and programmes so as to achieve practical synergies in technology development, both in terms of content and timing (as related to the ambition of the Clean Aviation SRIA and SBA Objectives). Together with the NextGenEU funds at least 100 % leverage, i.e., a further EUR 1.7 billion will be targeted through this collaboration and joint programming.

The CAJU plans to leverage recovery plans and NextGenEU funding as made available to the Member States and where earmarked for innovation. Active discussions are underway with Member States such as France, Spain, Italy, Germany and the Netherlands.’

Source: partnership fiches



In addition to these examples, further insights into this issue can be gained from the country fiches (see Chapter 3.3). According to these fiches, the countries plan to apply a more strategic approach to partnerships in Horizon Europe at the national level by supporting participation with an efficiently coordinated portfolio of (co)-funding. It is also clear that during Horizon 2020 countries have tried and will continue to try to create and find synergies with/for partnerships during the Horizon Europe period with other national, regional, and EU funds. The aim is to effectively support participation in European Partnerships and achieve the common goals of different programmes. Some complementary and cumulative funding schemes or matching programmes have already been used with success for Horizon 2020 partnerships and were mentioned in the country fiches (e.g. regional funding schemes for (co)-funding partnerships (Belgium, Greece), Seal for Excellence national-level funding schemes for the ERC seals of excellence and for SME instrument seals of excellence (Belgium); National Centres for Excellence Research for the same topics as EU-level partnerships have been created to support the achievement of common goals and priorities (Cyprus); and matching programmes for partnerships to use ESIF/ERDF funds for co-funding partnerships (being planned in Estonia, Hungary and Poland). If these schemes receive positive feedback, they are very likely to be continued and further developed ('New and simplified national granting processes as a sort of Seal of Excellence, for the allocation of funds, by automatically accepting the peer review done during the international evaluation.')

(Source: *Spain's country fiche*)

Country fiches also reveal that not all countries have been (fully) using the options of other Union funds and have rather been co-funding and creating synergies with national-level funds. However, they are becoming increasingly aware of these options and plan to use new EU funds which were not available during the previous funding period. ('Funding agencies at national level have not used other EU funds for co-funding Joint Transnational Calls during the period 2014-2020. Nevertheless, additional funding from the RRF will promote internationalisation of the national system. At regional level, some smart specialisation strategies foresee the use of European Structural and Investment Funds to co-fund joint international calls, enhancing the internationalisation of the regional systems.')

(Source: *Spain's country fiche*)

It is also clear that, for example, that structural funds are not available to all the countries to the same extent, but that synergies with these funds remain very important as a cumulative or complementary funding source for the coming years, and preconditions for such activities are under preparation. ('Participating in partnerships has been an example of synergy between different EU programmes: Estonia has supported participation in European Research Area activities (including partnerships) with ERDF: about 1/3 of ERA-NET participations in Horizon 2020 were funded from structural funds. This also remains a very important funding source in Horizon Europe. In Estonia, sectoral ministries are responsible for their sectorial partnerships. Therefore the national ministries actively seek co-funding from national level funding sources, and also from other EU funding sources.')

(Source: *Estonia's country fiche*).

Funds other than national or regional R&I funds were mentioned as great potential opportunities for synergies but also require co-operation and efforts by different ministries or regional authorities ('Ministries actively seek co-funding from national-level funding sources, and also from other EU funding sources to contribute to the fulfilment of Ireland's RD&I policy objectives.')

(Source: *Ireland's country fiche*)

The synergies between the Centres of Excellence created through the TEAMING scheme (supported under H2020 and Horizon Europe) and partnerships were mentioned ('[Centres of Excellence] are expected to become R&I technology hubs for Cyprus and beyond while making significant contributions to relevant partnerships.')

(Source: *Cyprus' country fiche*).

In conclusion, it is clear that countries are planning to capture the various opportunities for complementary and cumulative funding between national, regional, and Union funds. These synergies are often very dependent on the national preconditions created and on the national priorities, therefore governments have a very important role here.

2.5 ADDED VALUE OF EUROPEAN PARTNERSHIPS

This subchapter presents evidence and views about the added value of the partnerships under H2020, as documented in relevant ERA-LEARN reports, as well as the JU Annual Activity Reports and cPPP Progress Monitoring Reports. Indicative success stories based on the projects supported are also presented, although highlighting that the list is in no way exhausting. Anecdotal evidence is also presented, drawing on the inputs provided by the Member States and Associated Countries in the country fiches included in the next chapter.

2.5.1 IMPACTS OF H2020 P2PS BASED ON AVAILABLE LITERATURE

ERA-LEARN has conducted several studies⁹⁰ in relation to the impacts of participating in P2Ps, drawing on the testimonies from partnerships members (ERA-NETs, Art. 185s, JPIs) and public officials in participating states as well as individual researchers. Overall, the impacts can be grouped as follows:

- **Enduring connectivity** that relates to the networking and collaboration opportunities offered by partnerships and were highly appreciated both by the research community as well as by public officials. Benefits stemming from international collaboration were perceived by project beneficiaries while public officials appreciated the exchange of experience in managing international projects with foreign counterparts. They were also quite positive about improved collaboration across different ministries and with different funding agencies at the international level, although even more importantly at the national level, aspiring to less fragmentation in national R&I systems.
- **Capacity building** facilitated by the partnership programmes in subject areas where previously transnational collaboration amongst Member States was poor or non-existent. The multi-disciplinary approach promoted is also an important aspect of capacity building.
- **Attitudinal/cultural change**, both at the level of ministries and agencies as well as the research and business communities, and society. Within Member States, there are clearly impacts in attitudes manifested in multidisciplinary and interdisciplinary approaches being adopted in the research areas addressed. Examples of partnerships where such a change in attitude was mentioned include ERA-NETs, such as Biodiversa and CORE ORGANIC, or JPIs, like JPI Climate, Urban Europe, More Years Better Lives, and FACCE-JPI. Attitudes also changed in relation to investment in international calls. For example, in France, the National Funding Agency, ANR, decided to orientate a substantial part of the funds of its environment programme towards multilateral international calls related, for instance, to FACCE JPIs, Climate, Oceans and Water JPIs as well as other programmes such as ERA-NETs Biodiversa (I-II-III) and Belmont Forum calls. Another example was the UK's experience of the MACSUR Knowledge Hub developed under the FACCE JPI. This was a large flagship alignment activity in modelling research all around Europe. While the UK only devoted 'glue' money, this activity highlighted millions in investment in modelling research from UK Research Councils and the Scottish National Government.
- **Conceptual impact** refers to changed thinking among policymakers, influences on policy issues, and greater awareness in the policy world. There is already evidence of a conceptual impact through participation in partnerships and the resulting increased awareness among national governments of specific issues and topics. This is the case, for example, for cultural heritage, climate change and anti-microbial resistance research.

90) <https://www.era-learn.eu/support-for-Partnerships/governance-administration-legal-base/monitoring-and-assessment>

- **Structural impacts** relate to changes in institutions and structures in the national or European research landscape. Structural impact, in the form of changes to government organisation, is realised broadly across the Member States. New, interministerial forms or structures have been created responding to the need to coordinate national participation in P2Ps. These initiatives are expected to lead to less-fragmented national research systems. Structural impacts have also emerged from developing the SRIAs. This impact can be of two main types: first, the development of a national strategy in the specific area that did not exist before, as in the case of Norway and JPI Healthy Diet for Healthy Life (HDHL), and secondly, consideration of the SRIA in the national strategies in the respective areas or research such as in the area of water research for Cyprus.

Specifically with regard to the benefits perceived by project beneficiaries, the 2020 ERA-LEARN report on the analysis of impacts in three bioeconomy-related partnerships⁹¹ shows that researchers are triggered to participate in transnational R&I programmes to enjoy the usual benefits from international collaboration, including, for instance, access to complementary expertise and infrastructure, building capacity to access EU-wide funding opportunities, and building new and strengthening existing relationships with partners. For specific partnerships like those in the bioeconomy area, participation was mostly motivated by improving the research base as well as creating linkages between research and private organisations and practitioners. For newcomers, motivations mainly related to their potential to extend the organisation's policy outreach or to foster their organisation's performance.

The impact expectations on their own organisation, which were reported by the beneficiaries in the respective survey, may be summarised in four main factors: 1) 'increased economic benefits'; 2) 'increased research benefits'; 3) 'better evidence for policymaking and high-level of influence'; and 4) 'expected increase in organisational performance, including skills, competences and environmental performance'. Interestingly, for most of the survey respondents, impacts related to research were more likely to occur than economic impacts. Yet, the opportunity offered by these projects to link R&I activities alongside their 'problem-driven' nature and solve 'real-life problems for companies and practitioners' were appreciated by both the business and research communities alike.

The study also revealed that prospective economic impact does not only rely on external conditions, such as access to transnational resources, but also on internal management factors during a project's lifetime. The impact pathway for future policy impacts goes through a high project-based societal impact, the delivery of which is associated both with improving the scientific evidence base as well as with disseminating activities targeting academic and policy audiences. At the same time, the pathway of the R&I impact is also linked to managerial factors and, more importantly, shows that R&I are inseparable and work complementarily in achieving the same objective.

As emerged from the interviews with public officials who were members of the three bioeconomy-related partnerships studied, overall, transnational projects add value to existing national funding schemes, in particular complementing those at the subnational level. Some ERA-NETs were deemed instrumental in embedding EU-level priorities more clearly into national and regional agendas.

The 2021 ERA-LEARN/GPC⁹² report on the impact of the overall joint programming process at the national level collected responses from GPC delegates from 21 countries and the Belgian region of Flanders. The reports conclude that the partnerships have undoubtedly positively modified the European arena of transnational projects. In certain countries, this might not have been as evident as in others. This might be attributed to the national research community's already good international standing, as reported by Denmark, Spain, and Flanders, or the already good collaboration with other countries, as claimed by Denmark and Slovenia.

91) ERA-LEARN. 2020. Policy brief on impacts from three bioeconomy Partnerships, <https://www.era-learn.eu/support-for-Partnerships/governance-administration-legal-base/monitoring-and-assessment>. This ERA-LEARN Policy Brief presents the results of the impact assessment of three bioeconomy Partnerships: SUSFOOD, ICT-Agri, CORE ORGANIC II and their supported projects. The brief draws on the results of the online centralised impact assessment survey hosted by ERA-LEARN (responses submitted by participants up to December 2019 only). The survey has been complemented with 30 interviews held with Partnership members as well as project beneficiaries.

92) ERA-LEARN/GPC analysis of the impact of JPP and JPIs at the national level 2021: <https://www.era-learn.eu/documents/documents-listing>



However, the costs outweighed the benefits for both Flanders and Slovenia. A more general explanation is also pertinent here. The costs and benefits relate to the administrative burden that is caused by participation, the national contributions made available, and the benefits gained in terms of number of projects eventually approved. As Slovenia is one of the least-represented countries in overall participation in public R&I partnerships, based on the ERA-LEARN data, it is natural that the benefits are low which, in turn, exacerbates the perceived costs of participation.

The impact of participation in partnerships extends beyond supporting research projects and influencing policies or structures at the national level. It also relates to policy learning. When asked about the capacity of the research funding organisations to manage transnational programmes, respondents were divided into those stating that this had improved due to participation and those where capacities remained the same. When the performance of these countries is also examined in terms of participation in public R&I partnerships, based on the ERA-LEARN database, it turns out that the more the participation, the greater the benefits gained via mutual learning. However, it is also true that capacities may worsen because of the limited resources available to manage transnational collaboration in the first place.

The report also notes that, whereas the alignment of national policies was moderately achieved, the level of achievement of interoperability across national programming and policy cycles seems to have been particularly limited. Such barriers, along with the, usually, substantial efforts needed to administer participation in partnerships, and the lower success rates in some countries, might render the whole effort less worthwhile. These conditions are quite relevant to the new Horizon Europe partnerships, thereby making the lessons learnt from participating in the old type of partnerships quite valuable.

The report concludes that, although, the initial expectations were fulfilled to varying degrees across the countries – and this can be explained for various reasons – and more efforts are needed for the uptake of research results in policy and economy, respondents to the GPC survey reported several examples of influencing the national systems. To note just a few:

- BiodivERsA has been key to the development of a Belgian Biodiversity Platform to promote Belgian research and to act as a science-policy interface in biodiversity (Belgium).
- The national programme Mare:N in Germany considers strategic aspects of the SRIA of JPI Oceans (Germany).
- JPI Oceans SRIA used in National Marine Research & Innovation Strategy 2017-2021 (Ireland).
- The BYFORSK was clearly inspired by transdisciplinary and cross-sectoral scope of JPI UE (Norway).
- The new research and innovation act includes a provision that the missions of all ministries should address societal-challenge research, same for the new national strategy for internationalisation (Slovenia).
- Member States and communities of JPIs actively engaged in the design of the European Partnerships in Horizon Europe, e.g. JPI Urban Europe and the European Partnership – Driving urban transitions to a sustainable future (Driving Urban Transitions).
- ‘Participation in JPI Ocean has led to pan-European cooperation on two very critical topics which would not have taken place had it not been for JPI Oceans(...) FACCE JPI and HDHL have provided useful platforms for Norway (and the other MS/AC) to promote the need for R&I in the field of food and nutrition security (FNS) at the World Expo 2015 in Milano.’ (Norway)



In relation to success stories, some indicative examples are included in the ERA-LEARN publication *15 Years of European Public-Public partnerships in Research & Innovation*⁹³ which, however, do not do justice to the numerous examples included in the individual annual reports and websites of the 99 currently active P2Ps.

The research supported under E-RARE led to the identification of hundreds of new genes and the establishment of new diagnostics protocols and guidelines, as well as a number of patents filed. A project supported by WoodWisdom-Net (WW-N) 2, called FireInTimber, led to the very first European-wide guideline on the fire-safe use of wood in buildings. The results of the WW-N projects led to the creation of a special renovation system (by Paroc Group Oy) that is used in retrofit projects in several European countries. The research carried out under ERACoBioTech enabled the production of GMO-free kefir which led to an estimated 15% growth rate in the Chr. Hansen company, a global market leader in dairy ingredients that took up the results. The 2PCS Personal Protection and Caring System developed under AAL is a wearable technology designed to tackle the underlying causes of immobility. The specific system also incorporates Fearless, a sensory alarm system that detects accidents in the homes, which was also created in another AAL project. As another example, the ROSETTA project has developed an innovative, integrated system aiming at prevention and management of the problems that can occur in elderly people as a result of chronic progressive diseases (such as Alzheimer's).

A significant number of the Euramet European Metrology Research Programme (EMRP) projects contribute to the implementation of EU regulations in areas such as energy, environment, and health. As an example, EMRP research in advanced measurement techniques has resulted in an end-to-end traceability chain (from European National Measurement Institutes to end-users). This enables instrumentation manufacturers to verify the performance of new highly sensitive equipment that vehicle manufacturers and testing authorities use to demonstrate compliance with a new EU Regulation limiting emissions, which for the first time requires a test procedure to assess emissions under real driving conditions. The Joint Baltic Sea Research Programme (BONUS) contributes to policy and regulation in the battle against overfishing and to the sustainability of the Baltic Sea fish populations. As an example, the BONUS fisheries projects InSPIRE and GOHERR provided scientific information to define the total allowable catch and maximum sustainable yield of the fish population in the Baltic Sea. European and Developing Countries Clinical Trials Partnership (EDCTP) funding have made major contributions to the development of vaccines, diagnostics, and treatments for the most important infectious diseases affecting sub-Saharan Africa. It has also triggered the creation or capacity improvement of several clinical trial sites (in Republic of Guinea, Guinea Bissau, Mozambique, Namibia, Senegal and Tanzania), as well as the establishment of the first African clinical trials networks in the sub-Saharan regions.

As regard Art. 185 initiatives, the expert group on the meta-evaluation of Art. 185 initiatives⁹⁴ provided some insights into their added value. While the main aim of these initiatives is to address common challenges in specific research areas by creating economies of scale and synergies between national and EU research programmes and investments, their ambition is to achieve scientific, managerial, and financial integration amongst national research programmes in a given field. Article 185 initiatives have a number of distinctive features that set them apart from other partnering initiatives in Europe. These include the long-term perspective, the scale of national co-funding and their international visibility. They have demonstrated the attractiveness and versatility of the instrument across a wide variety of subjects that are of common interest to the relevant research funding organisations in different countries. Each Article 185 has been able to exploit these common interests in their own way and they have been successful in mobilising significant investment in transnational research projects in important policy areas, both global and/or regional. Overall, the Expert Group recognised that Article 185 initiatives managed to mobilise significant investments in important policy areas, not only of high European added value but also of global relevance. Their added value lies in the high quality of R&I projects not realisable at national level; the higher impacts and knowledge gains associated with transnational programmes; the strong network effects; the seeding of communities; and the catalytic effect on national initiatives and activities.

93) <https://www.era-learn.eu/documents/era-learn-publications/era-learn-15-yr-brochure-aw2-web.pdf>

94) <https://www.era-learn.eu/documents/documents-listing>. The main evidence for the meta-evaluation was based on an online survey of EU Member States and a series of hearings with important stakeholder groups, including the evaluators of the individual Art. 185 initiatives.



However, according to the Expert Group, there are a number of issues on the meta-evaluation of Art. 185 initiatives which (if addressed) could significantly improve their strategic impact beyond the research community. First, their prominence and synergy within both the national and EU policy landscape is rather unclear and a coherent selection process is not apparent. Secondly, their joint and collaboration activities do not extend much beyond the research community. Thirdly, there are significant barriers to participation for the less-R&D-intensive countries and underexploited synergies with the Structural Funds. Last, but not least, the H2020 legal and administrative framework for the Article 185 instrument is a major inhibiting factor for all concerned and there is scope for substantial simplification and shared infrastructure.

2.5.2 ADDED VALUE OF H2020 PPPS

The added value of industry-driven partnerships has been documented in the interim evaluation of H2020 JUs⁹⁵ based on consultation with stakeholders. As noted, their key strength is their ability to engage major, strategic industry partners in the EU's priority areas, across borders and business sectors. The JUs have managed to bring together competing or even previously unrelated stakeholders and created long-lasting collaborative networks. With a leveraging effect in mobilising private funds either in line with or above the targets set, JUs achieved very high stakeholder satisfaction for their services (more than 90%). The Expert Groups assigned to the interim evaluation of the JUs also identified certain challenges, including the uneven SME and widening countries' participation rates, and the need to revisit the KPIs and reinforce communication activities and to further align JU activities with policies at the EU, national and regional level.

Besides the interim evaluation, there is ample evidence in the JUs' Annual Activity Reports of the numbers of calls and projects supported as well as the level of achievement of the set KPIs. Numerous success stories are also identified on the JUs' websites. Although they do not comprise a comprehensive analysis of the impacts of JUs, they do indicate a strong potential to impact the economy and society. Some indicative examples are summarised below.

The BBI JU-funded EUCALIVA project, for instance, has achieved to extract industrial polymers from lignin, an alternative that grows on trees. The SHERPACK project argues that cellulosic materials fit current regulations pushing for sustainable packaging to replace fossil-based plastic packaging with biobased materials. The BBI JU-funded AgriMax project is working to make the most of organic waste. Researchers under the projects RECOVER, BIZENTE and ENZYCLE are turning their attention to microorganisms, enzymes, earthworms and insects to break down plastics, while the BBI JU-funded GRETE project is developing new, non-toxic and recyclable solvents that will boost the safety and sustainability of making textiles from wood⁹⁶.

Clean Sky introduces some of the most promising technologies in their 2020 Annual Report with the Tech TP engine demonstrator, the UltraFan technology demonstrator, RACER and Next GenCTR. The Tech TP project is working to develop a 100% European-built, sustainable, low-fuel and low-noise engine for use in general aviation and smaller commuter-sized aircraft (up to 19 passengers). UltraFan is a technology demonstrator for the next generation of environmentally friendly gas turbines for large commercial aircraft. RACER combines an innovative wing-box design with lighter structures and improved power management efficiency, while NextGenCTR features a fixed-engine, split gearbox drivetrain concept, with an advanced flight-control system, efficient nacelle architecture, advanced wing architecture and optimised tail configuration (Clean Sky Annual Activity Report, 2020).

Under ECSEL, some of the projects that finished in 2020 (Aguas, Autodrive, Scott) have led to the development of new hardware components, design tools, new standards and new market opportunities. The Dense project combines different types of sensors to make a self-driving car 'see' better than its driver in bad weather conditions; the ENSO project addressed the energy needs of small autonomous systems; and the SILENCE project dealt with some unique applications of ultrasound.

95) Commission Staff Working Document SWD(2017) 339 final, Brussels, 6.10.2017.

96) <https://www.bbi.europa.eu/success-stories-overview>



Other important achievements in 2020 include the White Papers by the Industry4.E Lighthouse Initiative (a cross-platform ECSEL – orientated Industry4.E strategic roadmap) and one from Health.E identifying more than 13 emerging medical domains that can be served now and in the future by the ECS industry (ECSEL, Annual Activity Report 2020).

The EuroHPC JU signed four contracts for petascale supercomputers to be hosted in Luxembourg, Czechia, Slovenia and Bulgaria, giving access to valuable computing resources in these countries. Two further contracts for precursor to exascale supercomputers were signed by the JU to be hosted in Italy and Finland (EuroHPC Annual Activity Report 2020).

Research under the Fuel Cells and Hydrogen (FCH) JU projects is targeting low-emission flight. A commercially viable fuel cell for zero-carbon emergency and in-flight power is being developed in FLHYSAFE, while HEAVEN is designing compressed-fuel tanks and a high-power fuel cell for fully hydrogen planes. FCH JU projects, such as H2ME and H2ME 2, are responsible for many of the 150 sites of public hydrogen refuelling stations in operation in Europe, making it the largest network in the world. FCH JU projects are scaling up electrolysers that generate hydrogen from renewables and installing them in large refineries and factories. This technology is considered a reliable, viable alternative to hydrogen production from natural gas, and can contribute to decarbonising industries and connected businesses in emerging hydrogen valleys. FCH has also supported policy with the launch of CertifHy3, for instance, a study on accelerating the deployment of Guarantees of Origin (GO) schemes for hydrogen and for the design of a voluntary scheme for compliance with the Renewable Energy Directive (RED II) targets, or with the public launch of the Fuel Cells and Hydrogen Observatory (FCHO) in collaboration with DG R&I⁹⁷.

The role of IMI 2 research has been decisive in addressing the COVID-19 pandemic. For example, the COVID treatment project CARE, launched in the wake of the COVID-19 pandemic outbreak, is the largest undertaking of its kind dedicated to accelerating the discovery and development of urgently needed treatment options for COVID-19 patients. It focuses on both identifying therapeutics for the current pandemic as well as long-term preparedness by identifying antiviral therapies for future outbreaks. The fellow COVID treatment project MAD-COV 2 has shown that a low-dose combination of the antiviral remdesivir and a drug called APN01 (hrsACE2) can stop the virus from multiplying in cells, paving the way for clinical trials. The diagnostics project RAPID-COVID has carried out field trials of its prototype point-of-care diagnostic instrument in preparation for a larger clinical validation study. New projects were also launched in 2020 to advance cancer research, thereby ensuring a strong contribution to the wider cancer mission. At the same time, IMI projects' outputs have been recognised by regulators in various ways. In July 2020, the European Commission officially granted market authorisation for an IMI-supported Ebola vaccine regimen which represents a vital tool in the fight against the deadly disease. INNODIA has developed a master protocol for certain clinical trials of treatments that could potentially stop type 1 diabetes that was supported by the European Medicines Agency in 2020. By the end of the year, the project had launched four clinical trials designed to test treatments to prevent and cure type 1 diabetes in people who have just been diagnosed. A study funded in part by IMI's EMIF project reveals three distinct subtypes of Alzheimer's disease, suggesting that a treatment which would benefit patients with one subtype may actually be harmful to patients with another subtype, thereby taking an important step towards more personalised treatments for people with Alzheimer's disease⁹⁸.

Shift2Rail (S2R) JU took a major step ahead of digital rail freight enabling new operations and services with the endorsement of the European DAC (Digital Automatic Coupler) Delivery Programme which builds upon the outcomes achieved in Shift2Rail's freight-related R&I activities (Innovation Programme 5). This programme brings together the rail sector beyond S2R Membership to bridge the research work with innovation, including migration planning, towards the deployment of a European DAC solution, built on open and transparent standard specifications (S2R Annual Activity Report 2020).

97) https://www.fch.europa.eu/sites/default/files/images/ALL_FCH_factsheets_2021%20%28ID%2012364795%29.pdf

98) <https://www.imi.europa.eu/projects-results/success-stories-projects>



Despite the challenging circumstances in the aviation sector, SESAR JU managed to deliver a batch of new digital solutions – in total, 32 are ready for implementation. SESAR projects and partners were among the winners of the Air Traffic Management Awards 2019, as outstanding performers spearheading innovation and leading the industry to ever-greater performance. The progress made regarding SESAR's virtual centre is pivotal. This centre refers to the decoupling of air traffic management (ATM) data services, such as flight data, radar, and weather information, from the physical controller working position (CWP). The aim is to enable greater flexibility when it comes to organising air traffic control operations and, in so doing, seamless and more cost-efficient service provision to airlines and other airspace users. While research is ongoing, the first results are promising, and this solution was identified in the recently published Airspace Architecture Study as a critical element for optimising Europe's airspace (SESAR Annual Activity Report 2020).

The cPPP instrument was designed to implement strategies to increase the competitiveness impact of European R&D funding through Horizon 2020. In this respect, it offered industry a more active role in the management of the instrument and in promoting higher technology readiness levels (TRLs) in the projects. The Expert Group that carried out the mid-term evaluation of the cPPPs highlighted that the instrument substantially achieved these targets. Inclusion and participation of SMEs are higher than on average in Horizon 2020 for most of the cPPPs. The Group also suggested that to increase the European value added of cPPPs and ensure a closer link between roadmaps and regional and national policies, a deeper involvement of Member States was desirable (EC, 2020⁹⁹).

Besides the results of the mid-term evaluation, cPPPs also demonstrate a variety of success stories. The H2020 projects supported by Energy-efficient Buildings contractual PPP (EeB cPPP) reported the development of a total of 260 new systems and technologies, as well as 104 non-technological innovations. A 38.4% reduction in energy use and a 40% reduction in CO₂ emissions is expected by the end of the projects. H2020 projects have already reported 24 patent applications and 85 are expected by the end of the projects. The EeB cPPP plays a vital role as the EU focal point of a scattered industry and transforming sector, representing a pan-European ecosystem of researchers, industrialists, owners, legislators, financiers, users' associations, etc. addressing the whole value chain and integrating different industries (EeB cPPP Progress Monitoring Report, 2019).

The Big Data Value cPPP supported project, DataBio, has shown promising results and uptake. For example, an olive farm managed to reduce its production costs (spraying and irrigation) by 30%; the Wuudis component in forestry management has matured commercially with deployment in Finland and an MoU with Sierra Leone; a forest health service is to be used by the Czechian Ministry of Agriculture for policy decisions. Another project, Transforming Transport, has generated 25 innovations with market value and with commercially exploitable potential. The FashionBrain project has developed FLAIR – a very simple framework for state-of-the-art natural language processing (NLP), officially integrated in the PyTorch ecosystem and referenced in many prestigious magazines and online sites, while the data Skipping technology developed under BigDataStack is already a beta service for IBM's SQL Cloud query.

The Factories of the Future cPPP has revitalised the interest of manufacturing stakeholders from all over Europe, including large companies and SMEs. The partnership generates meaningful results which contribute to the transformation of manufacturing in Europe, enabling the realisation of Industry 4.0. The FoF PPP has also provided a blueprint for many national and regional actors in the manufacturing domain which have launched similar national and regional activities, thereby improving the quality of national and regional programmes in the manufacturing domain (FoF cPPP, Monitoring Progress Report 2018).

99) European Commission, Directorate-General for Research and Innovation, *Mid-term review of the contractual Public Private Partnerships (cPPPs) under Horizon 2020: report of the independent expert group*, Publications Office, 2017, <https://data.europa.eu/doi/10.2777/699241>



The SPIRE cPPP has brought together eight process-industry sectors (cement, chemicals, ceramics, engineering, minerals, non-ferrous metals, steel, and water) to jointly address their R&I objectives at the EU level. SPIRE achieved the creation of trust among the multiple sectors and stakeholders within the SPIRE community. This was enabled by the strong link to EU policy developments and by having a significant and stable source of funding (EUR 900 million) dedicated to SPIRE calls under H2020. The SPIRE projects reported they might make significant improvements in energy and raw materials efficiency: on average, 36% reduction in fossil energy consumption (30% target); 30% reduction in CO₂e (up to 40% target), and 25% reduction in non-renewable primary raw material consumption (target up to 20%). Building on the knowledge and results of the projects is relevant for realising the SPIRE 2050 vision and roadmap. An example of this is the Hubs for Circularity which intends to promote a quantum leap towards the Business to Territory (B2T) plans as the future EU circular business models addressing the 3 Cs: climate, circular and competitiveness (SPIRE cPPP, Progress Monitoring Report, 2018).

The contractual PPP in Robotics (SPARC) has paid particular attention to helping SMEs. Based on the pioneering work of the ECHORD and ECHORD++ projects, a decision was made to build cascade calls into parts of the work programme to provide tailored support for SMEs where shorter, lower entry cost, smaller projects could enable them to access funds and carry out R&I in collaboration with a small number of partners. This led to several highly successful projects for SMEs. The development of the multi-annual roadmap and the extensive overview of robotics, that was enabled through the work of SPARC, has been used extensively by academia and companies alike to provide an overview and assess their technology portfolio. The feeling of ownership of the work programme enabled strategic direction to directly influence key items in calls. The ROSIN and RobMoSys projects were the direct result of a strategic push to drive impact towards particular aspects of robot software development. Similarly, the EUROBENCH and COVR projects were the direct result of strategic directions pushed by SPARC.

The HELIS and ALISE projects supported under the European Green Vehicles Initiative (EGVI) cPPP have achieved promising results on future chemistries for automotive batteries, particularly on lithium sulphur batteries, with promising developments in cell level, weight reduction and second life/recycling options. With its newly developed CNG engine technologies, the GasON project demonstrated a 18% reduction in CO₂ emissions compared to the 2014 best-in-class CNG engines. Projects dealing with improvements in particle measurements (DownToTen, SUREAL-23 and PEMs4Nano), sampling system development, and the PN-Portable Emission Measurement System demonstrator, could have a significant impact on improving air quality, particularly in urban areas, and positively impacting human health in a mid- to long-term perspective. XERIC's new hybrid climate control system (CCS) for EVs is proving good performance at TRL6 in reducing the energy used throughout the year for passenger comfort by more than 50% and the energy used for air cooling/dehumidifying in extreme summer conditions by 30% (EVGI Progress Monitoring Report, 2018).

A number of impactful projects supported under Photonics cPPP are mentioned in the Progress Monitoring Report, 2020. The OCTLIGHT project developed a new fast laser that helps doctors image the eye in full, while PULSEEU developed a powerful new laser that can boost the car industry. RAIS created a new blood test to diagnose sepsis in minutes. The OCTINION strawberry-picking robots are another success story, as is the laser-engraved metal developed by MULTIFLEX to reduce environmental impact (Photonics, Progress Monitoring Report, 2020)

In their partnership fiches included in Chapter 4, new partnerships comment on the uniqueness of the instrument involving all relevant types of stakeholders, bridging silos between research fields and sectors from the local to the national and transnational level. IHI aspires to become a unique platform that does not exist anywhere else, a multi-sector partnership for health innovation to break the silos between different industries and between industry and its respective stakeholders. The Artificial intelligence, data and robotics partnership wants to cohere the communities that underpin European AI, data and robotics. For BATT4EU, only a partnership – a long-lasting and coordinated effort involving industry, research, and the public sector – can bring predictability to EU battery value-chain stakeholders. The Sustainable Blue Economy partnership wants to contribute, through structured coordination and co-creation, to the integration in the blue economy of relevant sea-basin programmes, strategies and initiatives, including macro-regional strategies for co-creation, to generate impact at the local level.



2.5.3 ADDED VALUE OF H2020 PARTNERSHIPS BASED ON ERA-LEARN COUNTRY REPORTS AND THE COUNTRY FICHES INCLUDED IN THE PRESENT REPORT

The ERA-LEARN country report¹⁰⁰ are also a resource for insights into the value of the partnerships based on the views of ministries' and funding agencies' officials and individual researchers. Overall, European researchers see the value of partnerships in filling in a gap in the support for research. As they state, the smaller-scale projects enable the actual building of relationships which is harder to achieve in larger H2020 projects with dozens of partners. The administrative burden, which is already known as it follows the national rules, is smaller compared to the time-consuming efforts and expertise required to apply for H2020 grants. Sometimes the success rate is also higher than that in H2020. These conditions make the partnerships more appealing for researchers, especially for those newcomers in research programmes, and they see their participation in partnerships as a stepping stone for more ambitious, larger endeavours.

BOX 28. EXAMPLES OF THE ADDED VALUE OF H2020 PARTNERSHIPS

'The ACT [Accelerating CCS technology as a new low-carbon energy vector] call filled a gap in terms of the area of research addressed. Although there is the CCS programme in Norway but the funding has been decreasing and the block funding has been low so it is compulsory to find other funding opportunities. ACT also covered the area of CCS more comprehensively and in a more general way than H2020.' (project supported by ACT ERA-NET; ERA-LEARN report Norway)

'JPND allows research collaboration within EU and beyond (between the North and the South, East and West - very integrating in Europe) and is not as bureaucratic as H2020. The project participants have become so enthusiastic that we continued to collaborate after the official end of the project.' (project supported by JPco-fuND; ERA-LEARN report Norway)

'...In JPIs you can develop the project in a way that you can choose the type of research to do and allow a broader scope of research combining different types. In a national programme it would have to be either basic or applied and the focus is mainly at the national (rather than international) level.' (project supported by ENSUF/JPI Urban Europe; ERA-LEARN report Belgium)

'E-RARE is ideal for small groups working on rare diseases. We cannot possibly compete either at national or European level. H2020 is highly competitive with much lower success rates, let alone that rare diseases are not addressed that much anyway; ... Belgian funding authorities should ensure that such instruments are maintained in the future.' (project supported by E-RARE, ERA-LEARN report Belgium)

'... In this regard, our project has been crucial in an area that our company has already been working on. If we were to finance it on our own, we would not probably do it in this way, i.e. it might have been with less resources...We hope to have a follow-up project to take this further and develop marketable products,' (project supported under PhotonicSensing ERA-NET; ERA-LEARN report Belgium)

'The call advertisement was straightforward as the procedure for preparing the proposal. Proposals did not need to be long (around 20 pp.) This was much better compared with H2020 proposals that are around 80 pp...In comparison to national programmes, JPI MYBL allows and promotes multi-disciplinarity; the call themes require that several scientific fields work together, and this is a great thing!' (JPI MYBL project; ERA-LEARN report Finland)

'These types of trans-national projects are important both for building capacity to get involved in larger, follow-on projects but also as important means of achieving certain goals that need a small number of countries to do comparative analysis...The fact that this is a small, manageable project enables us to really work together, create collective knowledge and acknowledge each other's' contribution.' (BiodivERSa projects; ERA-LEARN report Finland)

'Compared with national programmes in DEMOWIND you are able to collaborate with others and the funding levels are higher. Compared to H2020, the process is much easier and less time-consuming...The scope of DEMOWIND is also very appealing to us as it allows for closer-to-market research and demonstration projects with high TRLs.' (Project beneficiary; ERA-LEARN report Spain)

100) <https://www.era-learn.eu/documents/documents-listing>

BOX 28. CONTINUED

‘Partnerships are absolutely critical for Europe in providing opportunities for trans-national collaboration with the best scientists in the area. The projects helped create a European network (multiple sclerosis research and especially neuron immunology) of top labs that are highly engaged in such projects. This is a critical advantage that goes much beyond what the national projects can do that allow for international partnerships but usually not more than 1-2 partners... The research led to changes in scientific perceptions of how multiple sclerosis research should be addressed and this paved the way for significant progress in the field.’ (*NEURON project beneficiary; ERA-LEARN report Austria*)

Source: ERA-LEARN country reports

Nevertheless, researchers also noted the difficulties created by the different national rules of participation and timings in the funding cycles, which sometimes affected not only the projects’ starting times but also the ability to fulfil all planned activities.

Public officials in ministries and funding agencies largely agreed with the researchers’ views and also appreciated the opportunities offered for mutual learning in relation to the policy design and management of international programmes. They also stressed the need for time for impacts to become visible as well as more collaboration among the partnerships.

BOX 29. EXAMPLES OF MUTUAL LEARNING

‘ERA-NETs help us streamline our research priorities and support the decision process at the national level’ (BMNT official). ‘The JPI potential is heavily underestimated in terms of the benefits it can bring to the EU. You get national systems and institutes aligned and involved in joint efforts. This is much more than having EU funds invested in an area’ (BMBWF official). ‘Collaboration between partnerships may be improved. EUROSTARS might offer the next step for collaboration among organisations and smaller companies that may have started their collaboration in specific partnerships. However, it is important that EUROSTARS remains a bottom-up programme.’ (*BMDW official*) (*ERA-LEARN report Austria*).

‘It is difficult to find arguments to convince the political level of the value of these schemes especially if the results (number of approved projects) are not as high as expected and the efforts you put in to manage the networks are rather heavy. But that doesn’t mean it has not been worth the effort. On the contrary, it should be encouraged to find ways to facilitate participation and improve the results.’ (*Innobasque official*) (*ERA-LEARN report Spain*)

‘From the Finnish point of view, the public-private partnerships can really work well if and when some level of openness is ensured specially to accommodate smaller players’ (Business Finland Officials). ‘The access to knowledge and infrastructure enabled through international collaboration outweighs the national commitments made. This is very important for a small country like Finland...Thus, the net benefit is positive, despite the hard work needed by the (Ministry of Agriculture and Forestry).’ (*MMM officers*) (*ERA-LEARN report Finland*)

‘ERA-NETs and R&I partnerships overall, are interesting starting points for further collaboration at international or EU level, while industrial PPPs open new markets and opportunities for internationalisation’ (INNOVIRIS official). ‘Getting in contact with colleagues internationally through which you learn a lot of things is very important, even though this may not be among the primary objectives of the partnerships... Younger researchers are pulled in by stronger teams and this is highly beneficial in building or strengthening research capacities’ (FWO officials). ‘An important element next to the research side is that participating companies get in contact with counterparts in other countries with whom they compete in the market but are actually getting to collaborate with each other under the projects... Moreover, it offers the opportunity to companies, in particular SMEs, to participate in international value chains.’ (*Flanders Innovation & Entrepreneurship, VLAIO officials*) (*ERA-LEARN report Belgium*)



BOX 29. CONTINUED

'We have several motivations to take part in partnerships. We believe we can solve domestic challenges and problems by working together on the international arena... We also acknowledge that many of our challenges are global, expressed through the Sustainable Development Goals, and that we have to work together – internationally and globally – to solve them.' (*Ministry of Education and Research Officials*) (*ERA-LEARN report Norway*)

Source: ERA-LEARN country reports

The country fiches in this report (Chapter 3) include similar insights articulated by the country delegates themselves. European Partnerships present a clear added value in terms of the opportunities they offer for international collaboration in smaller teams under well-known national rules and procedures, with higher success rates than Horizon 2020. They are a good steppingstone especially for less-experienced researchers to enter the international arena, and the eligibility of certain non-EU countries is highly appreciated.

BOX 30. EXAMPLES OF INTERNATIONAL COLLABORATION IN SMALLER TEAMS

'Moreover, partnerships often serve as a nucleus for stable and long-term R&I cooperation networks in the ERA. These networks proved to be key to tackling global challenges as well as ensuring Europe's technological sovereignty beyond the EU's R&I framework programme.' (*Germany's country fiche*)

'From the perspective of a funding agency or a research performing organisation, PRIMA is a success story as it provides opportunities for cooperation with countries in the immediate neighbourhood outside the EU and it addresses research and innovation fields that are not adequately covered in H2020 calls.' (*Greece's country fiche*)

'The National Science Centre's participation in ERA-NET co-fund programmes was a stepping stone for building bilateral and multilateral initiatives with international partners, as well as the successful application for EU funds.' (*Poland's country fiche*)

Source: Country fiches

At the same time, partnerships have been instrumental in consolidating certain policy areas at the national level and boosting international collaboration in key areas of interest for the countries' involved.

BOX 31. EXAMPLES OF BOOSTING INTERNATIONAL COLLABORATION

'Health-related partnerships, for example, have contributed to the consolidation of that domain, which has been defined as a national priority area only a little over 10 years ago.' (*Luxembourg's country fiche*).

'The GEOTHERMICA ERA-NET has been a successful component of Iceland's strategy to increase and expand international cooperation in this field. This can be seen from the fact that 27% of the funding to Icelandic participants in Horizon 2020 is within the field of secure, clean and efficient energy.' (*Iceland's country fiche*).

Source: Country fiches