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PART 7/19

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

**Proposal for a COUNCIL REGULATION establishing the Joint Undertakings under
Horizon Europe**

European Partnership for Key Digital Technologies

{COM(2021) 87 final} - {SEC(2021) 100 final} - {SWD(2021) 38 final}

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Annex 1 Procedural Information

1. LEAD DG, DECIDE PLANNING REFERENCES

Co-Lead DG: Directorate-General for Communications Networks, Content and Technology (CNECT), Directorate-General for Research and Innovation (RTD)

Decide number: PLAN/2019/5389

2. ORGANISATION AND TIMING

Institutionalised partnerships are foreseen in Articles 185 and 187 of the Treaty on the Functioning of the European Union (TFEU). The preliminary agreement on Horizon Europe contained a list of possible areas for institutionalised partnerships based on Article 185 and 187. For each of these areas the Commission considered 12 potential institutionalised partnerships. Their set up involves new EU legislation and the establishment of dedicated implementing structures and therefore an impact assessment for each of these initiatives.

Following political validation in June 2019, the impact assessment process started with the publication of inception impact assessments for each initiative in August 2019.

An inter-service steering group (ISSG) on research and innovation partnerships under Horizon Europe was set up in May 2019 and held 4 meetings before submission of the Staff Working Document to the Regulatory Scrutiny Board (7 May 2019, 19 June 2019, 5 December 2019, 20 January 2020). The ISSG consisted of representatives of the Secretariat-General, Directorate-General for Budget, Directorate-General for Research and Innovation, Directorate-General for Communications Networks, Content and Technology, Directorate-General for Mobility and Transport, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Directorate-General for Energy, Directorate-General for Environment, Directorate-General for Climate Action, and the Legal Service.

An online public stakeholder consultation was launched between September and November 2019, gathering 1635 replies for all 12 initiatives.

3. CONSULTATION OF THE RSB

Two upstream meetings with the Regulatory Scrutiny Board were held on 10 July 2019 and 30 September 2019.

The Staff Working Document was submitted to the Regulatory Scrutiny Board for a hearing that took place on 13 May 2020. In accordance with the feedback received from the Regulatory Scrutiny Board on 15.05.2020 the Staff Working Document has been revised as presented in Figure 1. These revisions were endorsed by the Inter Service Steering Group on 10 June 2020.

4. EVIDENCE, SOURCES AND QUALITY

To ensure a high level of coherence and comparability of analysis for all candidate initiatives, an external study was procured to feed into the impact assessments of the 12 candidate

institutionalised partnerships¹. It consisted of a horizontal analysis and individual thematic analyses for each of the initiatives under review.

For all initiatives, the evidence used includes desk research partly covering the main impacts and lessons learned from previous partnerships. A range of quantitative and qualitative data sources complement the evidence base, including evaluations; foresight studies; statistical analyses of Framework Programmes application and participation data and Community Innovation Survey data; analyses of science, technology and innovation indicators; reviews of academic literature; sectoral competitiveness studies and expert hearings. The analyses included a portfolio analysis, a stakeholder and social network analysis in order to profile the actors involved as well as their co-operation patterns, and an assessment of the partnerships' outputs (bibliometrics and patent analysis). A cost modelling exercise was performed in order to feed into the efficiency assessments of the partnership options. Public consultations (open and targeted) supported the comparative assessment of the policy options. For each initiative up to 50 relevant stakeholders were interviewed by the external contractor (policymakers, business including SMEs and business associations, research institutes and universities, and civil organisations, among others). In addition, the analysis was informed by the results of the Open Public Consultation (Sep – Nov 2019), the consultation of the Member States through the Strategic Programme Committee and the online feedback received on the Inception Impact Assessments of the set of candidate Institutionalised European Partnerships.

A more detailed description of the methodology and evidence base used, completed by thematic specific methodologies, is provided in Annexes 4 and 6.

Figure 1 Modifications to the draft Staff Working Document based on comments received from the Regulatory Scrutiny Board

Comments from the Regulatory Scrutiny Board	Actions taken for the Staff Working Document
The report pre-selects certain sectors and technologies for support, instead of setting out the best partnership approach for promoting a competitive innovation environment.	The revised text in section 4 (Objectives) makes clear that there are no preselected priorities, neither for specific technologies nor specific sectors. It describes the preparation of what would constitute the Strategic Research and Innovation Agenda (SRIA). This is where sectors, technologies and applications would be identified and updated annually based on technological trends and political priorities. The preparation itself would be done through an inclusive and multi-stakeholder participative process.
The dividing lines between this partnership and other initiatives that support research and innovation in the ICT sector are not clear.	The differences in scope and the interactions foreseen with relevant partnerships and initiatives, both digital-centric and related applications, are now addressed in section 1.3. The strategic importance of building and maintaining these interactions under the current and future European policies and

¹ Technopolis Group, 2020, forthcoming.

	priorities is highlighted.
The report does not sufficiently integrate the mid-term evaluation findings of the existing Joint Undertaking into the problem description and the intervention logic.	Conclusions and recommendations from the mid-term evaluation of the existing JU are described in the box “Support to the field in the previous Framework Programme – Key strengths and weaknesses identified”. They have been taken into consideration, and integrated into the problem definition and intervention logic (sections 2.1, 4.3 and 4.4). Moreover, specific actions are identified addressing the main findings of the mid-term evaluation.
The report does not score the options in a consistent way. It does not justify how it weighs the different impacts when arriving at the preferred option.	The justifications and the accompanying scores corresponding to the various impacts in the analysis of options have been reviewed (in both the text and the tables section 6) and checked for consistency. The section includes an updated comprehensive comparative assessment of all options under consideration.
Additional comments	Actions taken for the Staff Working Document
How would the partnership differ from the existing Joint Undertaking?	The table in Section 6 describing the differences between the envisaged initiative and the existing JU (‘what continues’ and ‘what is different’ columns) have been updated. In section 1 and throughout the report the differences between the candidate KDT and existing ECSEL are also highlighted.
What ways are envisaged to help materialise a co-financing of 1:3, given the uncertainties surrounding the overall budget and design of the partnerships? How can these risks be mitigated?	The 1:3 leverage target is based on the ECSEL experience and feedback received in recent consultations with Member States and industry associations. The report now describes how the 1:3 leverage is achieved in ECSEL (section 1.2). The ambition is that the KDT initiative achieve a similar target (Sections 4.4 and 6.2). This depends ultimately on how this can be implemented under HE and is still pending internal discussion.
The IA should report stakeholders’ views, in particular those of relevant minorities. It should also appropriately treat the views of respondents considered as participating in a ‘campaign’.	A ‘campaign’ of 20 respondents has meanwhile been identified in the open public consultation (OPC). These responses have been omitted in the OPC analysis. They have been treated and reported separately. Stakeholder opinions from OPC and interviews are included in relevant parts of the Impact Assessment, now including minority views with indication of type of supporting stakeholders.

Recommendations accompanying positive opinion	Actions taken for the Staff Working Document
Substantiate further the societal impacts of the preferred option and its scoring	The societal impacts associated to the long-term planning, the portfolio approach and tripartite model of the preferred option (institutionalised partnership based on Art. 187) have been elaborated further. They cover joint public-private societal priorities, a balanced set of projects that address societal challenges, and the contribution to the initiative of national societal impacts through the involvement of Participating States. The scoring associated to the preferred option (++) Option presenting a high potential compared to the baseline) has been further justified on the basis of the elements provided in the analysis of societal impacts for the various options. See Pages 66-68.
Clarify interactions with projects and recently announced EU policies and priorities	Details have been included on interaction with specific policies announced recently (data strategy, industrial strategy) and initiatives (recovery plan for Europe). Also the interactions with Horizon Europe have been elaborated further as well as with relevant partnerships (AI, data and robotics). See P. 33-34
Address uncertainties of funding level and ways to cope with potential lower financing	The fact that the financing level is uncertain at the time of writing the assessment is addressed by proposing ways to ensure a sound match between the scope and objectives of the initiative and the overall amount of resources allocated. See P. 55
Report in a more consistent way the minority views	Stakeholder opinions are included throughout the assessment. This includes views expressed by stakeholders in response to the open public consultation or at interviews conducted in the context of the supporting study. Minority views (with indication of type of stakeholders) have been more consistently reported next to the dominating opinions. See the blue boxes throughout the document..

The table above summarises modifications introduced in the revised KDT Impact Assessment to address the comments received with the RSB Opinion and issues raised at the Impact Assessment Quality Checklist as well as comments received at the RSB hearing.

Annex 2 Stakeholder Consultation

1. OVERVIEW FOR ALL CANDIDATE INSTITUTIONALISED EUROPEAN PARTNERSHIPS

1.1. Introduction

In line with the Better Regulation Guidelines,² the stakeholders were widely consulted as part of the impact assessment process of the 12 candidates for institutionalised partnerships, including national authorities, the EU research community, industry, EU institutions and bodies, and others. These inputs were collected through different channels:

- A feedback phase on the inception impact assessments of the candidate initiatives in August 2019, gathering 350 replies for all 12 initiatives on the “Have your say” web portal during a period of 3 weeks;
- A structured consultation of Member States performed by the EC services over 2019 through the Shadow Strategic Configuration of the Programme Committee of Horizon Europe (in line with the Article 4a of the Specific Programme of Horizon Europe). This resulted in 44 possible candidates for European Partnerships identified as part of the first draft Orientations Document towards the Strategic Plan for Horizon Europe (2021-2024), taking into account the areas for possible institutionalised partnerships defined in the Regulation.
- An online public stakeholder consultation administered by the EC, based on a structured questionnaire, open between September and November 2019, gathering 1635 replies for all 12 initiatives;
- A targeted consultation run by the external study contractors with a total of 608 interviews performed as part of the thematic studies by the different study teams between August 2019 and January 2020.

1.2. Horizontal results of the Open Public Consultation

The consultation was open to everyone via the EU Survey online system.³ The survey contained two main parts to collect views on general issues related to European partnerships (in Part 1) and specific responses related to one or more of the 12 candidate initiatives (as selected by a participant). The survey was open from 11 September till 12 November 2019. The consultation was available in English, German and French and advertised widely through the European Commission’s online channels as well as via various stakeholder organisations.

1.2.1. Profile of respondents

In total, 1635 respondents filled in the questionnaire of the open public consultation. Among them, 272 respondents (16.64%) were identified to have responded to the consultation as part of a campaign (coordinated responses). Based on the Better Regulation Guidelines, the groups of respondents where at least 10 respondents provided coordinated answers were labelled as ‘campaigns’, segregated and analysed separately and from other responses. In total 11 campaigns were identified, the largest of them includes 57 respondents⁴. In addition, 162

² https://ec.europa.eu/info/files/better-regulation-guidelines-stakeholder-consultation_en

³ <https://ec.europa.eu/eusurvey/runner/ConsultationPartnershipsHorizonEurope>

⁴ The candidate Institutionalised Partnership Clean Hydrogen has the highest number of campaigns, namely 5. A few initiatives, such as Innovative SMEs, Smart Networks and Systems, were not targeted by campaigns. Some campaign respondents decided to provide opinions about several partnerships.

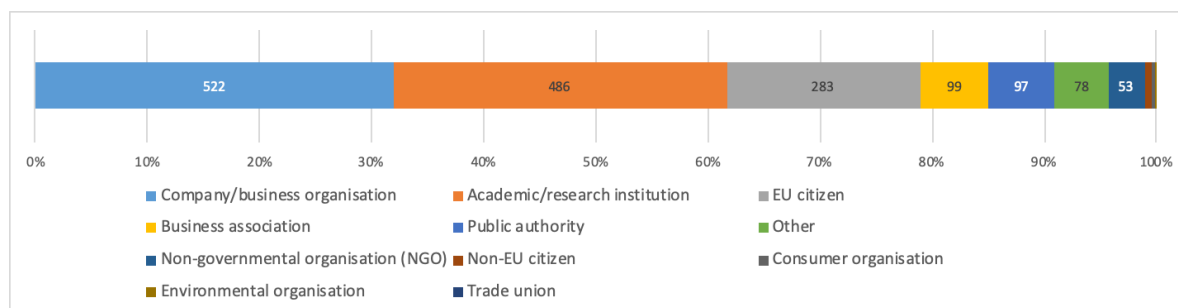
respondents in the consultation also display similarities in responses but in groups smaller than 10 respondents. Hence, these respondents were not labelled as campaigns and therefore were not excluded from the general analysis.

Table 1: Country of origin of respondents (N=1635)

Country	Number of respondents	Percentage of respondents
Germany	254	15.54%
Italy	221	13.52%
France	175	10.70%
Spain	173	10.58%
Belgium	140	8.56%
The Netherlands	86	5.26%
Austria; United Kingdom	61	3.73%
Finland	49	3.00%
Sweden	48	2.94%
Poland	45	2.75%
Portugal	32	1.96%
Switzerland	28	1.71%
Czechia	24	1.47%
Greece	23	1.41%
Norway; Romania	22	1.35%
Denmark	20	1.22%
Turkey	19	1.16%
Hungary	14	0.86%
Ireland	12	0.73%
United States	11	0.67%
Estonia; Slovakia; Slovenia	10	0.61%
Bulgaria; Latvia	9	0.55%
Bosnia and Herzegovina	7	0.43%
Lithuania	4	0.24%
Canada; Croatia; Israel	3	0.18%
China; Ghana; Iceland; Japan; Luxembourg; Morocco	2	0.12%
Bhutan; Botswana; Cyprus; Iran; Malta; Mexico; Moldova; Mongolia; Palestine; Russia; Serbia; South Africa; Tunisia; Ukraine; Uruguay	1	0.06%

As shown in Figure 2, the three biggest **categories of respondents** are representatives of companies and business organisations (522 respondents or 31.9%), academic and research institutions (486 respondents or 29.7%) and EU citizens (283 respondents or 17.3%). Among the group of respondents that are part of campaigns, most respondents are provided by the same groups of stakeholders, namely company and business organisations (121 respondents or 44.5%), academic and research institutions (54 respondents or 19.8%) and EU citizens (42 respondents or 15.4%).

Figure 2 Type of respondents (N=1635) - For all candidate initiatives



Among all consultation respondents, 1303 (79.69%) have been **involved in the on-going research and innovation framework programme** Horizon 2020 or the preceding Framework Programme 7, while 332 respondents (20.31%) were not. In the group of campaign respondents, the share of those who were involved in these programmes is higher (245 respondents out of 272 or 90.07%) than in the group of non-campaign respondents (1058 out of 1363 or 77.62%). When respondents that participated in the Horizon 2020 or in the preceding Framework Programme 7 were asked to indicate in which capacity they were involved in these programmes, the majority stated they were a beneficiary (1033 respondents) or applicant (852 respondents). The main stakeholder categories, e.g. companies/business organisation, academic/research institutions, etc., show a similar distribution across the capacities in which they ‘have been involved in Horizon 2020 or in the Framework Programme 7’ as the overall population of consultation respondents.

Among those who have been involved in Horizon 2020 or the preceding Framework Programme 7, 1035 respondents (79.43%) are/were **involved in a partnership**. The share of respondents from campaigns that are/were involved in a partnership is higher than for non-campaign respondents, 89.80% versus 77.03% respectively. The list of partnerships under Horizon 2020 or its predecessor Framework Programme 7 together with the numbers, percentages of participants is presented in Table 4, the table also show the key stakeholder categories for each partnership. Most consultation respondents participated in the following partnerships: Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking, Clean Sky 2 Joint Undertaking, European Metrology Programme for Innovation and Research (EMPIR) and in Bio-Based Industries Joint Undertaking. The comparison between the non-campaign and campaign groups of respondents shows that the overall distribution is quite similar. However, there are some differences. For the campaign group almost a half of respondents is/was involved in the Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking, a higher share of campaign respondents is/was participating in Clean Sky 2 Joint Undertaking and in Single European Sky Air Traffic Management Research (SESAR) Joint Undertaking.

When respondents were asked in which **role(s) they participate(d) in a partnership(s)**, over 40% indicated that they act(ed) as partner/member/beneficiary in a partnership. The second largest group of respondents stated that they applied for funding under a partnership. The roles selected by non-campaign and campaign respondents are similar.

Table 4: Partnerships in which consultation respondents participated (N=1035)

Name of the partnership	Number and % of respondents from both groups (n=1035)	Number and % of respondents from a non-campaign group (n=815)	Academic/research institutions	Business associations	Company/business organisations	Company/business organisations	EU citizens	NGOs	Public authority
Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking	354 (33.33%)	247 (30.31%)	97	9	37	43	41	8	5
Clean Sky 2 Joint Undertaking	195 (18.84%)	145 (17.79%)	57	2	10	27	37	1	7
European Metrology Programme for Innovation and Research (EMPIR)	150 (14.49%)	124 (15.21%)	64	0	13	9	14	2	19
Bio-Based Industries Joint Undertaking	142 (13.72%)	122 (14.97%)	39	8	20	27	14	1	6
Shift2Rail Joint Undertaking	124 (11.98%)	101 (12.40%)	31	7	5	31	14	3	7
Electronic Components and Systems for European Leadership (ECSEL) Joint Undertaking	111 (10.72%)	88 (10.80%)	42	2	7	20	12	0	5
Single European Sky Air Traffic Management Research (SESAR) Joint Undertaking	66 (6.38%)	46 (5.64%)	10	3	3	20	3	2	3
5G (5G PPP)	53 (5.12%)	47 (5.77%)	20	1	6	14	5	0	1
Eurostars-2 (supporting research-performing small and medium-sized enterprises)	44 (4.25%)	40 (4.91%)	17	0	6	1	7	0	6
Innovative Medicines Initiative 2 (IMI2) Joint Undertaking	37 (3.57%)	35 (4.29%)	18	2	3	3	2	4	3
Partnership for Research and Innovation in the Mediterranean Area (PRIMA)	28 (2.71%)	26 (3.19%)	15	0	3	1	2	0	2
European and Developing Countries Clinical Trials Partnership	25 (2.42%)	24 (2.94%)	12	0	1	2	3	3	2
Ambient Assisted Living (AAL 2)	22 (2.13%)	21 (2.58%)	11	2	1	1	3	0	3
European High-Performance Computing Joint Undertaking (EuroHPC)	22 (2.13%)	18 (2.21%)	6	0	2	3	5	0	2

For the remaining of the consultation, respondents could provide their views on each/several of the candidate initiatives. The majority of respondents (31.4%) provided their views on the

Clean Hydrogen candidate partnership. More than 45% of respondents from the campaigns selected this partnership. Around 15% provided their views for European Metrology, Clean Aviation and Circular Bio-based Europe. The share of respondents in the campaign group that chose to provide views on the Clean Aviation candidate partnership is of 20%. The smallest number of respondents provided opinions on the candidate initiative ‘EU-Africa research partnership on health security to tackle infectious diseases – Global Health’.

Table 5: Candidate Institutionalised Partnerships for which consultation respondents provide responses (N=1613)

Name of the candidate Institutionalised European partnership	Number and % of respondents from both groups (n=1613)	Number and % of respondents from a non-campaign group (n=1341)
Clean Hydrogen	506 (31.37%)	382 (28.49%)
European Metrology	265 (16.43%)	225 (16.78%)
Clean Aviation	246 (15.25%)	191 (14.24%)
Circular bio-based Europe	242 (15%)	215 (16.03%)
Transforming Europe’s rail system	184 (11.41%)	151 (11.26%)
Key Digital Technologies	182 (11.28%)	162 (12.08%)
Innovative SMEs	111 (6.88%)	110 (8.20%)
Innovative Health Initiative	110 (6.82%)	108 (8.05%)
Smart Networks and Services	109 (6.76%)	107 (7.98%)
Safe and Automated Road Transport	108 (6.70%)	102 (7.61%)
Integrated Air Traffic Management	93 (5.77%)	66 (4.92%)
EU-Africa research partnership on health security to tackle infectious diseases – Global Health	49 (3.04%)	47 (3.50%)

1.2.2. Characteristics of future candidate European Partnerships

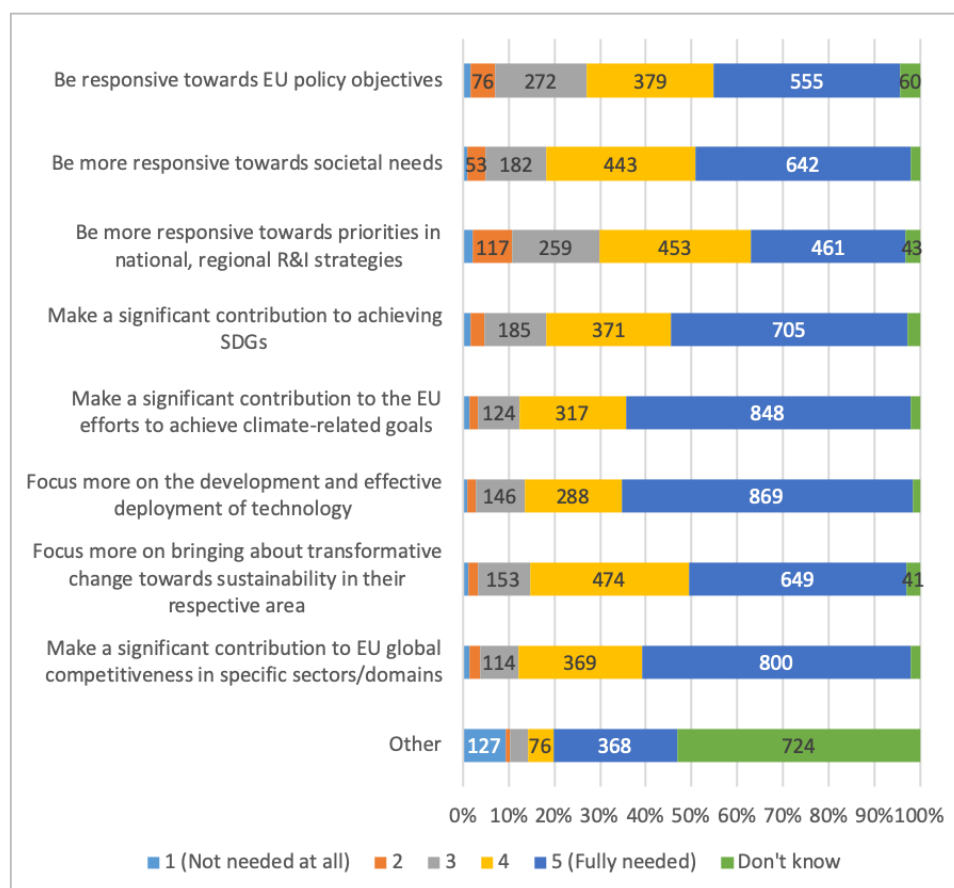
Respondents were asked to assess what areas, objectives, aspects need to be in the **focus of the future European Partnerships** under Horizon Europe and to what extent. According to Figure 6, a great number of respondents consider that a significant contribution by the future European Partnerships is ‘fully needed’ to achieve climate-related goals, to the development and effective deployment of technology and to EU global competitiveness in specific sectors/domains. Overall, respondents’ views reflect that many aspects require attention of the Partnerships. The least attention should be paid to responding towards priorities of national, regional R&D strategies, including smart specialisation strategies, according to respondents.

Overall, only minor differences can be found between the main stakeholder categories. Academic/research institutions value the responsiveness towards EU policy objectives and focus on development and effective deployment of technology a little less than other respondents. Business associations, however, find that the future European Partnerships under Horizon Europe should focus a little bit more on the development and effective deployment of technology than other respondents. Furthermore, business associations, large companies as well as SMEs value the role of the future European Partnerships for significant contributions to EU global competitiveness in specific sectors domains a little higher than other

respondents. Finally, both NGOs and Public authorities put a little more emphasis on the role of the future European Partnerships for significant contributions to achieving the UN SDGs. The views of citizens (249, or 18.3%) do not reflect significant differences with other types of respondents. However, respondents that are/were directly involved in a partnership under Horizon 2020 or its predecessor Framework Programme 7 assign a higher importance of the future European Partnerships to be more responsive towards EU policy objectives and to make a significant contribution to achieving the UN's Sustainable Development Goals.

A qualitative analysis of the “other” answers highlights the importance of collaboration and integration of relevant stakeholders to tackle main societal challenges and to contribute to policy goals against which fragmentation of funding and research efforts across Europe should be avoided. Additionally, several respondents suggested that faster development and testing of technologies, acceleration of industrial innovation projects, science transfer and market uptake are needed. Next to that, many respondents provided answers related to the hydrogen and the energy transition, which corresponds to the high number of respondents that provided answers to the candidate initiative on this topic.

Figure 6: To what extent do you think that the future European Partnerships under Horizon Europe need to (N=1363) (non-campaign replies) For all candidate initiatives



1.2.3. Main advantages and disadvantages of Institutionalised European Partnerships

An open question asked to outline the main advantages and disadvantages of participation in an Institutionalised European Partnership (as a partner) under Horizon Europe (1551 respondents). The advantages mentioned focus on the development of technology, overall

collaboration between industry and research institutions, and the long-term commitment. Disadvantages mentioned are mainly administrative burdens. An overview is provided below.

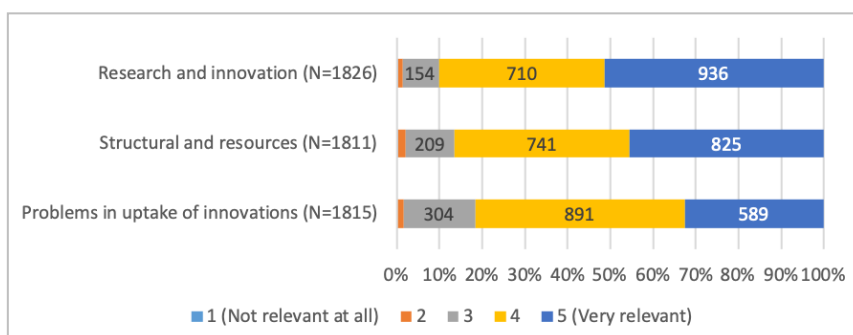
Advantages mentioned: Long term commitment, stability, and visibility in financial, legal, and strategic terms; Participation of wide range of relevant stakeholders in an ecosystem (large/small business, academics, researchers, experts, etc.); Complementarity with other (policy) initiatives at all levels EU, national, regional; Efficient and effective coordination and management; High leverage of (public) funds; Some innovative field require high levels of international coordination/standardisation (at EU/global level); Ability to scale up technology (in terms of TRL) through collaboration; Networking between members; Direct communication with EU and national authorities.

Disadvantages mentioned: Slow processes; System complexity; Continuous openness to new players should be better supported as new participants often bring in new ideas/technologies that are important for innovation; Lower funding percentage compared to regular Horizon Europe projects; Cash contributions; Administrative burdens; Potential for IPR constraints.

1.2.4. Relevance of EU level to address problems in Partnerships' areas

Respondents were asked to rate the **relevance of research and innovation efforts at EU level efforts to address specific problems in the area of partnerships**. Research and innovation related problems were rated as most relevant across all candidate initiatives, followed by structural and resources problems and problems in the uptake of innovations. Overall, all three areas were deemed (very) relevant across the partnerships, as more than 80% of respondents found these challenges (very) relevant. Only minor differences were found between stakeholder categories. Research and innovation problems were found slightly more relevant by academic/research institutions, yet slight less relevant by large companies and SMEs. Structural and resource problems were indicated as slightly more relevant by NGOs, but slightly less by academic/research institutions. While both NGOs and public authorities find slightly more relevant to address problems in uptake of innovation than other respondents. The views of citizens are not differing significantly. Respondents that are/were directly involved in a current/preceding partnership find, however, the need to address problems related to the uptake of innovations slightly more relevant than other respondents.

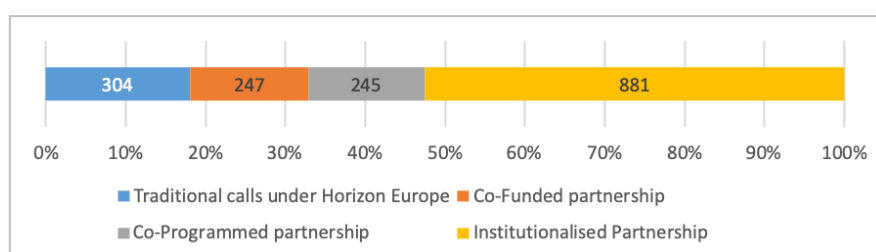
Figure 9: To what extent do you think this is relevant for research and innovation efforts at EU level to address the following problems in relation to the candidate partnership in question? (non-campaign replies) Aggregation of responses of all candidate initiatives



1.2.5. Horizon Europe mode of intervention to address problems

Respondents were asked to indicate how these challenges could be addressed through **Horizon Europe intervention**. Just over 50% of all respondents indicated that institutionalised partnerships were the best fitting intervention, with relatively strong differences between stakeholder categories. The use of Institutionalised Partnership was indicated more by business associations and large companies, but less by academic/research institutions and SMEs. While academic/research institutions valued traditional calls more often, this was not the case for business associations, large companies and public authorities. Public authorities indicated a co-programmed intervention more often than other respondents. Citizens indicated slightly less often that institutionalised partnerships were the best fitting intervention. Respondents that are/were directly involved in a current/preceding partnership, selected the institutionalised partnership intervention in far higher numbers (nearly 70%).

Figure 10: In your view, how should the specific challenges described above be addressed through Horizon Europe intervention? (non-campaign replies) For all candidate initiatives



When asked to reflect on their answers, respondents that pointed to the need for using institutionalised partnership mentioned the long-term commitment of collaboration, a common and ambitious R&I strategy as well as the overall collaboration between industry and research institutions. Others shared positive experiences with other modes of interventions:

- Traditional calls, because of their flexibility and integration of a wide range of actors, as long as the evaluation panels do not deviate from the policy focus. This was mentioned by 94 participants, including companies (25), academics (26) and EU citizens (25).
- Co-funded partnership, as a mechanism to ensure that all participants take the effort seriously, while allowing business partnerships to develop. This approach was deemed suitable based on previous experiences with ERANETs. This was raised by 84 participants, 36 of them academic respondents, 18 companies and 16 EU citizens.
- Co-programmed partnerships, to tackle the need to promote and engage more intensively with the private sector. This was mentioned by 97 participants, most of them companies (34), followed by academics (22), business associations (15) and EU citizens (11).

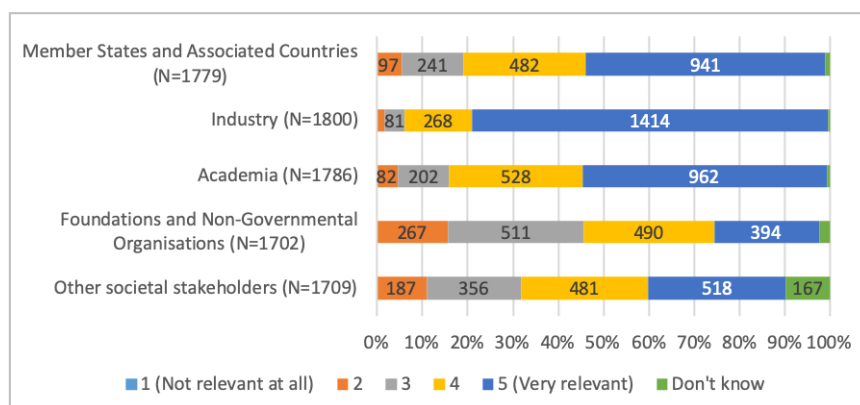
1.2.6. Relevance of a set of elements and activities to ensure that the proposed European Partnership would meet its objectives

Setting joint long-term agendas

Respondents were asked how relevant it is for the proposed European Partnerships to meet their objectives to have a strong involvement of specific stakeholder groups in setting joint

long-term agenda. All respondents see stakeholders from industry as the most relevant, followed by academia and governments. The involvement of foundations and NGOs as well as other societal stakeholders were, however, still found to be (very) relevant by more than 50% of the respondents. Most respondents indicated the stakeholder group they belong to themselves or that represent them as relevant to involve.

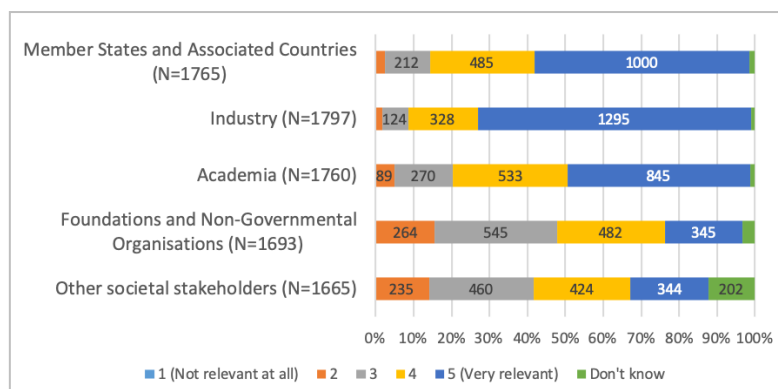
Figure 11: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives - Setting joint long-term agenda with strong involvement of: (non-campaign replies) For all candidate initiatives



Pooling and leveraging resources through coordination, alignment and integration with stakeholders

Respondents were asked how relevant it is for the proposed European Partnership to meet its objectives to pool and leverage resources (financial, infrastructure, in-kind expertise, etc.) through coordination, alignment and integration with specific groups of stakeholders. Respondents see stakeholders from industry as the most relevant, followed by academia and governments (Member States and Associated Countries). The involvement of foundations and NGOs as well as other societal stakeholders are also still found to be (very) relevant for more than 50% of the respondents. Similarly as described for the question on setting joint long-term agendas, most stakeholder categories valued their own involvement higher than other respondents – although also here differences between stakeholder categories were minor.

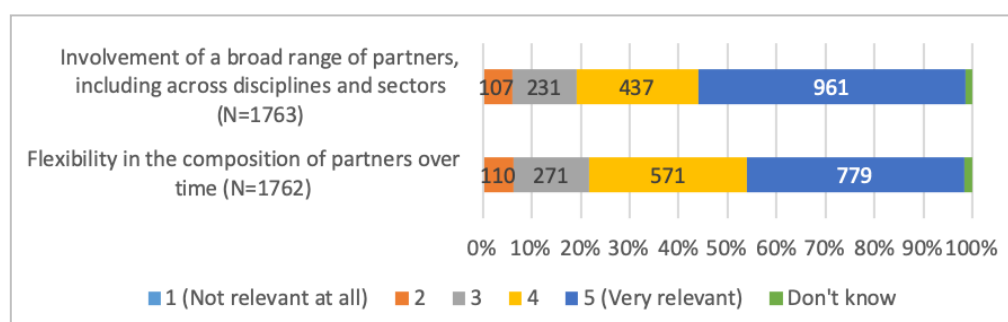
Figure 12: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Pooling and leveraging resources (financial, infrastructure, in-kind expertise, etc.) through coordination, alignment and integration with: (non-campaign replies) For all candidate initiatives



Composition of the partnerships

Regarding the composition of the partnership most respondents indicated that for the proposed European Partnership to meet its objectives the composition of partners needs to be flexible over time and that a broad range of partners, including across disciplines and sectors, should be involved (see Figure 13). When comparing stakeholder groups only minor differences were found. Academic/research institutions and public authorities found the involvement of a broad range of partners and flexibility in the composition of partners over time slightly more relevant than other respondents, while large companies found both less relevant. SMEs mainly found the flexibility in the composition of partners over time less relevant than other respondents, while no significant differences were found regarding the involvement of a broad range of partners. Citizens provided a similar response to non-citizens. Respondents that are/were directly involved in a current/preceding partnership, when compared to respondents not involved in a current/preceding partnership, indicated a slightly lower relevance of the involvement of a broad range of partners and flexibility in the composition of partners over time.

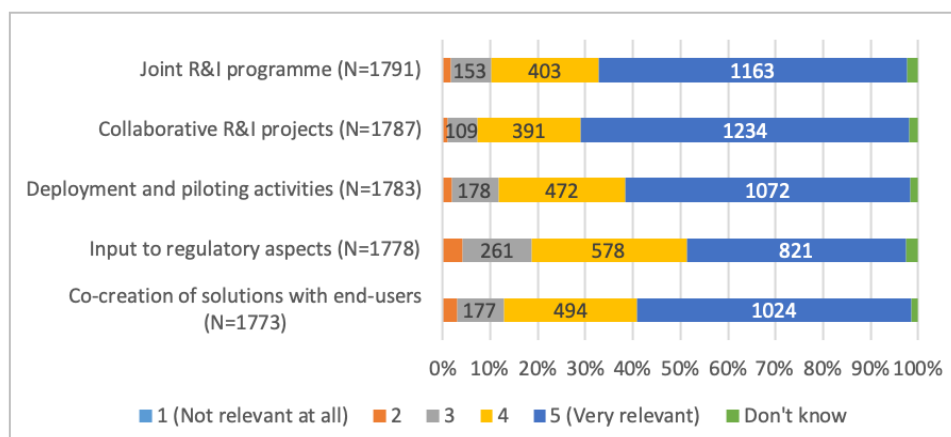
Figure 13: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Partnership composition (non-campaign replies) Aggregation of responses of all candidate initiatives



Implementation of activities

Most respondents indicated that implementing activities like a joint R&I programme, collaborative R&I projects, deployment and piloting activities, providing input to regulatory aspects and the co-creation of solutions with end-users are all (very) relevant for the partnerships to be able to meet its objectives. Minor differences were found between the main stakeholder categories, the differences found were in line with their profile. As such, academic/research institutions found joint R&I programme & collaborative R&I projects slightly more relevant and deployment and piloting activities, input to regulatory aspects and co-creation with end-users slightly less relevant than other respondents. For SMEs an opposite pattern is shown. Large companies, however, also found collaborative R&I projects slightly more relevant than other respondents, as well as input to regulatory aspects. The views of citizens are similar to non-citizens. Respondents that are/were directly involved in a current/preceding partnership, when compared to respondents not involved in a current/preceding partnership, show a slightly higher relevance across all activities.

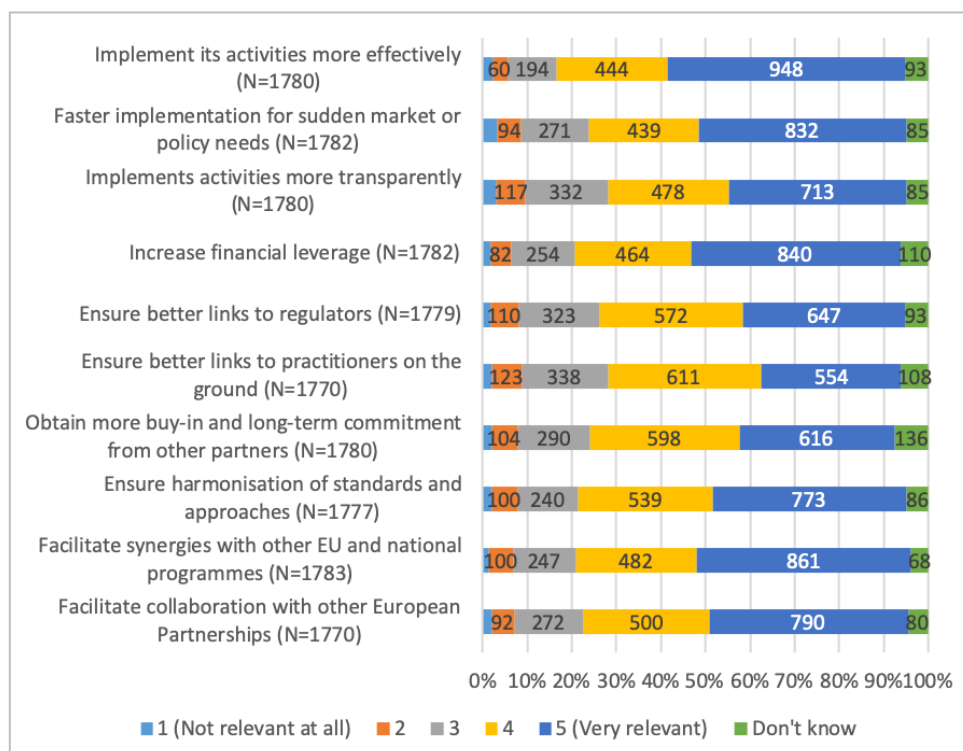
Figure 14: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Implementing the following activities (non-campaign replies) For all candidate initiatives



1.2.7. Relevance of setting up a legal structure (funding body) for the candidate European Partnerships to achieve improvements

Respondents were asked to reflect on the relevance of setting up a legal structure (funding body) for achieving a set of improvements, as shown in the Figure below. In general, 70%-80% of respondents find a legal structure (very) relevant for these activities. It was found most relevant for implementing activities in a more effective way and least relevant for ensuring a better link to practitioners on the ground, however differences are small.

Figure 15: In your view, how relevant is to set up a specific legal structure (funding body) for the candidate European Partnership to achieve the following? (non-campaign replies) Aggregation of responses of all candidate initiatives

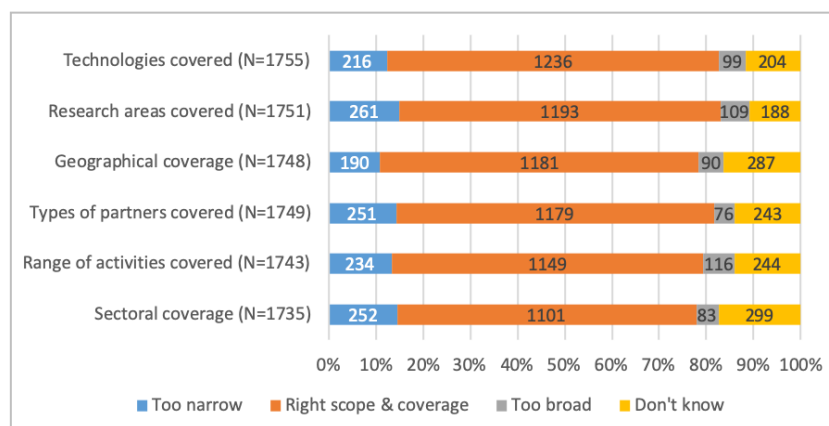


When comparing stakeholder categories there are only minor differences. Academic/research institutions indicated a slightly lower relevance for transparency, better links to regulators as well as obtaining the buy-in and long-term commitment of other partners. SMEs also indicated a lower relevance regarding obtaining the buy-in and long-term commitment of other partners. Large companies showed a slightly higher relevance for implementing activities effectively, ensure better links to regulators, obtaining the buy-in and long-term commitment of other partners, synergies with other EU/MS programmes and collaboration with other EU partnerships. NGOs find it slightly more relevant to implement activities faster for sudden market or policy needs. Public authorities, however, find it slightly less relevant to facilitate collaboration with other European Partnerships than other respondents. The views of citizens show a slightly lower relevance for a legal structure in relation to implementing activities in an effective way. Respondents that are/were directly involved in a current/preceding partnership indicated a higher relevance across all elements presented.

1.2.8. Scope and coverage of the candidate European Partnerships based on their inception impact assessments

Consulted on the scope and coverage for the partnerships, based on their inception impact assessments, the large majority feels like the scope and coverage initially proposed in the inception impact assessments is correct. However, about 11% to 15% of the respondents indicated the scope and coverage to be too narrow. About 11%-17% of respondents answered “Don’t know”. Overall, differences between the main stakeholder categories were found to be minor. Academic/research institutions indicated slightly more often that the research area was “too narrow” than other respondents. SMEs on the other hand indicated slightly more often that the research area and the geographical coverage were “too broad”. NGOs and public authorities, however, found the geographical coverage slightly more often “too narrow”. Large companies found the range of activities slightly more often “too broad” and the sectoral focus slightly more often “too narrow” when compared to other respondents. The views of citizens are the same as for other respondents. Respondents that are/were directly involved in a current/preceding partnership more often indicated that the candidate institutionalised European Partnership have the “right scope & coverage”.

Figure 16: What is your view on the scope and coverage proposed for this candidate institutionalised European Partnership, based on its inception impact assessment? (non-campaign replies) Aggregation of responses of all candidate initiatives



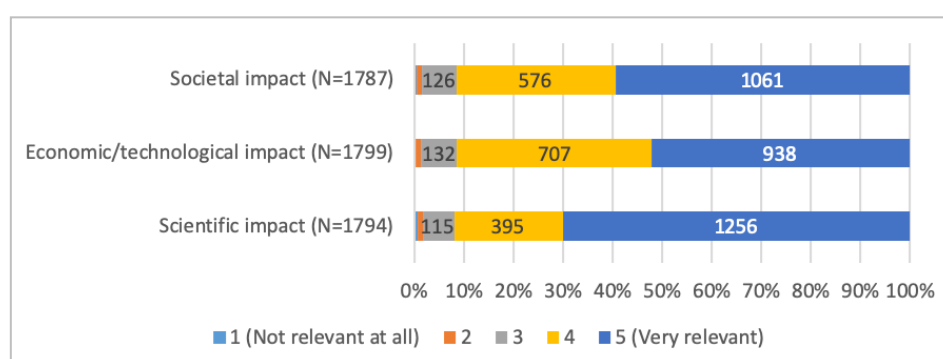
1.2.9. Scope for rationalisation and alignment of candidate European Partnerships with other initiatives

When asked whether it would be possible to rationalise a specific candidate European Institutionalised Partnership and its activities, and/or to better link with other comparable initiatives, nearly two thirds of respondents answered “Yes” (1000, or 62%), while over one third answered “No” (609, or 39%). Nearly no differences were found between stakeholder categories, only large companies and SMEs indicated slightly more often “Yes” in comparison to other respondents. The views of citizens are the same as for other respondents. Respondents that are/were directly involved in a current/preceding partnership, indicated “No” more often, the balance is about 50/50 between “Yes” and “No” for this group.

1.2.10. Relevance of European Partnerships to deliver targeted scientific, economic/technological and societal impacts

Finally, respondents were asked to rate the relevance of partnership specific impacts in three main areas: Societal; Economic/technological; and Scientific impacts. All three areas were deemed (very) relevant across the candidate partnerships. Scientific impact was indicated as the most relevant impact, more than 90% of respondents indicated that this as (very) relevant. Only minor difference between stakeholder groups were found. Academic/research institutions found scientific impacts slightly more relevant, while large companies found economic and technological impacts slightly more relevant than other respondents. NGOs found societal impact slightly more relevant, while SMEs found this slightly less important. Citizens did not a significantly different view when compared to other respondents. Respondents that are/were directly involved in a current/preceding partnership find all impacts slightly more relevant than other respondents.

Figure 17: In your view, how relevant is it for the candidate European Institutionalised Partnership to deliver on the following impacts? (non-campaign replies) Aggregation of responses of all candidate initiatives



1.3. Stakeholder consultation results for this specific initiative

1.3.1. Scope of the consultation

Key Digital Technologies (KDT) have been identified as one of the Commission's research and innovation initiatives under the Horizon Europe 'Digital, Industry and Space' cluster (Pillar II-Cluster 4). It is proposed to be supported by one of the European Partnerships in the envisaged partnership area of "Advancing key digital and enabling technologies and their use, including but not limited to novel technologies such as Artificial Intelligence, photonics and quantum technologies" (Area 2).

The Commission conducted a series of stakeholder consultations with various stakeholder groups of different levels (e.g. Member States, R&I funding beneficiaries, industry associations, citizens, etc.) to seek views on EU Research and Innovation (R&I), and on the proposed KDT Partnership. In particular, the consultation activities focused on the need for, the scope and coverage, the type and the planned focus of this partnership.

1.3.2. Whom has the Commission consulted

The Commission consulted a wide range of stakeholders (e.g. public authorities, companies, business organisations, academia, research organisations and end-users) to anticipate a broad involvement of interested participants in the partnership. The consultation activities included but were not limited to those which applied for and/or received funding from the current Framework Programme or the interrelated partnership in Electronic Components and Systems for European Leadership (ECSEL), stakeholders from the European ICT and technological domains (current and emerging), and from vertical application areas. These targeted stakeholders were complemented by the identification of additional relevant stakeholders to be consulted, based on an external study undertaken to feed into the impact assessment for each of the potential institutionalised European Partnerships.

In summary, the following type of stakeholders have been consulted:

- The research community, consisting of academic/research institutions such as universities, public government-funded organisations, independent organisations or private research centres.
- The industrial community, which includes large companies, SMEs and Start-ups, material suppliers and equipment manufacturers.
- Public authorities, such as ministries and national bodies for research, EU institutions and bodies.
- EU citizens responding on their own behalf.
- Interested independent authorities and platforms.

representing a vast research, development and user community of nanoelectronics, embedded intelligent systems, smart system integration, semiconductor manufacturing, photonics and integrated software; a convergence of areas of research in KDT.

1.3.3. How has the Commission consulted?

The Commission launched a structured consultation of Member States through the Shadow Strategic Configuration of the Programme Committee Horizon Europe, which provided early

input⁵ into the preparatory work and resulted in 44 possible candidates for European Partnerships, taking into account the identified areas for possible institutionalised partnerships.

In addition, an open public consultation that covered all 12 potential institutionalised partnerships based on Articles 185 and 187 TFEU was launched. This consultation collected input from a broad range of stakeholders, across Europe and associated countries, on both the overall approach and the individual candidates for institutionalised partnerships.

Furthermore, a combination of written consultation tools and direct interactions with stakeholders were put in place, seeking input, views, ideas and experiences. Several (targeted) meetings and stakeholder workshops on the specific issues covered by the proposed partnership were organized to discuss and gather detailed input on various policy options. The identified option in the impact assessment largely builds on the outcome of these consultations with stakeholders.

1.3.4. Feedback received on the Inception Impact Assessment

The inception impact assessment⁶ of the initiative was published for feedback from 30 July 2019 to 27 August 2019, with the aim to seek initial feedback. Seventeen reactions were received on the inception impact assessment, notably from industry associations dealing with electronics components and systems, academic/research institutions, private business organisations, public authorities and citizens.

In summary, the majority of the reactions stressed the need for and emphasized support to such an initiative. According to the feedback received, several respondents asked for a broadening of the scope of the proposed KDT Partnership – e.g. the need to integrate semiconductor-based integrated photonics, selected software technologies (beyond embedded software) and their applications to cover full value chains and networks.

1.3.5. Meetings & Workshops with Stakeholders

From the private sector (Industry, Research, and Academia)

A series of meetings and workshops between the European Commission and key European private organisations have taken place, to discuss potential activities to be covered under a KDT partnership, the requirements and links between suppliers and users of digital technologies, the KDT value chains and application areas where these technologies play an essential role:

On February 1, 2018 in Brussels, high-level representatives of companies and research and technology organisations (RTOs) active in semiconductor technology met with Mariya Gabriel, the Commissioner for Digital Economy and Society, to discuss a consolidated set of strategic measures for electronics value chains in Europe. The outcome of this meeting – together with a series of specific KDT value chain workshops/consultations (March-April 2018) on automotive, health, space/aeronautics, security, hardware for AI, robotics and automation - resulted in a report: ‘Boosting Electronic Value Chains in Europe’⁷. The report

⁵ European Partnerships under Horizon Europe: results of the structured consultation of Member States (Report)

⁶ https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-4972315_en

⁷ <https://ec.europa.eu/digital-single-market/en/news/boosting-electronics-value-chains-europe>

sets out an updated strategy for the electronics sector in Europe, and makes the case for a change in approach and outlines a set of actions intended to set the basis for future European policy.

In June 2019, a draft Implementation Plan (IP), as a direct development of the aforementioned report on ‘Boosting Electronics Value Chains in Europe’, was presented by key industrial organisations to the European Commission. This Implementation Plan included a specific chapter on a KDT partnership.

In September and November 2019 the European Commission met with Integrated Device Manufacturers (IDMs) to discuss a strategic cooperation between key European nanoelectronics companies, that would ensure leadership in KDT for edge computing, including specific activities that would potentially be covered under such a Partnership.

In October 2019 a workshop with KDT System Houses took place in Brussels, to specifically address the requirements of users of digital technologies. It covered mostly the demand side of KDT value chains and addressed applications where these technologies play an essential part.

In November 2019 at the European Forum for Electronic Components and Systems - EF ECS2019⁸ in Helsinki, a High-level meeting took place between CONNECT Deputy Director General Khalil Rouhana and representatives of main Nanoelectronics companies, to further discuss a renewed strategy in Europe under the new Commission. It addressed the actions proposed in the implementation plan and the specific role of private members in a future KDT partnership.

From the Public sector (Members States)

In April and May 2019, two meetings took place with Member State representatives, building upon a consultation process on a potential follow-up Joint Undertaking (JU) to the current ECSEL JU, under Horizon Europe.

In May/June 2019, a Member State consultation was realised on the proposed portfolio of European Partnerships under Horizon Europe. 30 countries (all Member States, Iceland and Norway) provided feedback, which has been analysed by the Commission services and summarised (overall and per partnership candidate) in a report⁹. In summary, the overall feedback was positive on the proposed portfolio, with a general satisfaction to the thematic coverage.

On the proposed KDT Partnership, opinions strongly supported its high relevance in the national context, while also raising the importance of the scope of partners and relevant stakeholders, the need to provide strong support to and impact on SMEs, and the limitation of activities related to photonics and to those that require a very strong integration with electronic devices. Synergies with other partnerships within and outside the cluster would need to be ensured.

The results of the Member State consultation strongly confirmed the KDT partnership approach in addressing the specific priority and the overall relevance, also in line with

⁸ <https://efecs.eu/>

⁹ European Partnerships under Horizon Europe: results of the structured consultation of Member States (Report)

national policies, priorities and R&I strategies, as well as for industry, research organisations and universities.

In October 2019, Member State representatives met with the EC to discuss their involvement in a potential KDT Partnership and the desired complementary steps to improve efficiency of implementation of an improved tri-partite model.

In November 2019, the Commission organised three workshops with Member State representatives on European Partnerships, to obtain a better understanding of the possible benefits of a collaboration between Member States and the candidate European Partnerships with industry, and its format. The discussions with the MS representatives were important to early detect opportunities to align on joint priorities, as well as to consider in design and preparation of implementation of the partnerships, thus ensuring discussions would be embedded in policy developments of a concrete field and high engagement of sectoral ministries.

One of the three workshops was on Digital Technologies, in which KDT was featured, highlighting its foundation of an existing and solid collaboration with Member States under ECSEL JU, and underlining the aim to ensure EU/national alignment through combined financing, as well as increase collaboration in testing of components. Overall, the digital-centric partnership was considered of high-relevance, since Europe has a dynamic and innovative digital industry.

1.3.6. Open Public Consultation

An online public consultation took place from 11 September 2019 to 12 November 2019, with the aim to seek the views of EU research and innovation stakeholders and citizens on the 12 proposed institutionalised European partnerships under the future Horizon Europe Research and Innovation programme (2021-2027). The consultation was available in English, German and French. It was advertised widely the European Commission's online channels as well as via various stakeholder organisations.

The consultation focused on the overall need for and the planned focus of these potential European partnerships, and had a part with specific questions on the proposed KDT Partnership.

Characteristics of Respondents

For the KDT Partnership, 182 respondents provided their views of which 20 were identified as belonging to a campaign. These campaign contributions were analysed separately and are not part of the actual analysis with a number of 162 responses.

Out of these 162 non-campaign responses, 55 (33.95%) of the respondents were representatives of academic and research institutions, 42 (25.93%) were company/business organisations, 35 respondents (21.60%) were citizens. Public authorities (4,32%) and NGOs (3,08%) also participated in the consultation.

The majority of respondents, namely 124 (76.54%), have been involved in the on-going research and innovation framework programme, while 84 respondents (67.74%) were directly involved in a partnership under Horizon 2020 or its predecessor Framework Programme 7.

Results on General Questions by non-campaign respondents

Relevance of efforts of the candidate European Partnership to address problems

At the beginning of the consultation, the respondents of this partnership indicated their views of the needs of the future European Partnerships under Horizon Europe. Overall, respondents indicated that many of these needs were fully required. The needs where most respondents indicated this, was making a significant contribution to EU global competitiveness in specific sectors and/or domains (112 respondents or 69.14%) and focusing more on the development and effective deployment of technology (101 respondents or 62.35%). These identified needs are in line with its proposed focus of the Partnership. No statistical differences were found between the views of citizens and other respondents for most needs.

Main advantages and disadvantages of participation in the Institutionalised European Partnership

The respondents were asked what they perceived to be the main advantages and disadvantages of participation in an Institutionalised European Partnership (as a partner) under Horizon Europe. A key-word analysis showed that respondents viewed collaboration as the main advantage, in addition to a strategic research agenda and leadership in Europe. The subsequent administrative burden was identified as a disadvantage.

Results on candidate European Partnership Specific Questions by non-campaign respondents

Relevance of research and innovation efforts at the EU level to address problems in relation to key digital technologies

In the consultation, respondents were asked to provide their view on the relevancy (5-point scale) of research and innovation efforts at EU level to address the following problems in relation to key digital technologies:

- Problems in uptake of digital innovations

With regard to the problems in uptake of digital innovations, the majority of respondents have picked either a 4 or a 5 on the 5-point relevancy scale. Respondents indicated that the most relevant problem is when the regulatory framework lags behind technology developments (106 respondents or 67.95% indicated this as a ‘relevant’ or ‘very relevant’ problem). The options that have received the least 5 (‘very relevant’) answers, out of all the problems presented, are the lack of consideration of societal or user needs (37 respondents or 23%) followed by the barriers to exploitation due to limited access to capital data or intellectual property (37 respondents or 24%).

- Structural and resource problems

With regard to structural and resource problems, the limited collaboration and pooling of resources between Member States, European Commission, Industry and Research organisations (Universities, RTO’s) is clearly considered as a very relevant problem for research and innovation efforts at EU level to address (65 respondents or 42% indicated a 5 on the 5-point relevancy scale).

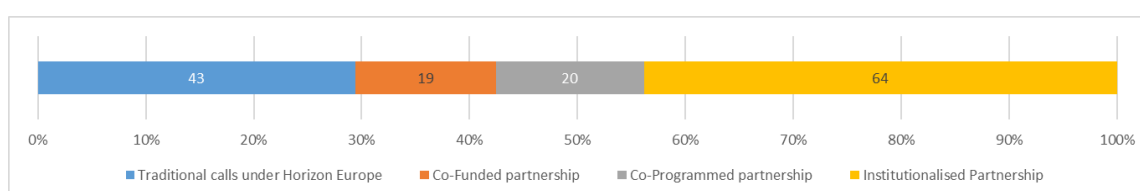
- *Research and innovations problems*

Finally, respondents have indicated that research and innovation problems are considered the most relevant, as all of the problems presented in this category have received more 5 (very relevant) responses than any of the other problems. The rapid change including big data and the emergence of new computing paradigms is considered the most relevant, with 105 respondents selecting ‘very relevant’ on this problem (66%).

Addressing the specific challenges through Horizon Europe intervention

- *Type of partnership*

Respondents were asked to indicate how these challenges could be addressed through Horizon Europe intervention. As shown in the figure below, just over 40% of respondents indicated that an Institutionalised Partnership would be the best fitting intervention to address these problems.



Respondents that selected an institutionalised partnership as the best fitting intervention mentioned for example that it is the most suitable instrument to “*bring together the critical mass of public and private resources needed to ensure Europe’s competitiveness, sovereignty and autonomy in the strategic domain of KDT*”. Furthermore, several respondents signalled its suitability to implement a long-term vision and to provide “*substantial and long-term guidance on the R&I activities in the EU*”, the “*broad impact and wide range of stakeholders*” in the key digital technologies area, and the importance of “*aligning national strategies on digital technologies into a single EU strategy*”.

Respondents who did not select institutionalised partnership as their preferred intervention (N=76) mentioned traditional calls, public private sector and the development of new technology.

Relevance of elements and activities to ensure that the proposed European Partnership would meet its objectives

- *Involvement of actors in setting joint long-term agenda*

Respondents were asked how relevant the involvement of actors is in setting a joint long-term agenda to ensure that the proposed European Partnership would meet its objectives. A high number of respondents (120 respondents or 77%) indicated that a strong involvement of industry is very relevant actor for setting a joint long-term agenda. The role of academia and Member States, Associated Countries is also considered very relevant by many respondents (respectively 95 respondents or 61.29%, and 76 respondents or 51.35% indicated their role of as ‘very relevant’). A strong involvement of foundations, NGOs and other stakeholders is considered less relevant by respondents (respectively 30 respondents or 20.69%, and 18 respondents or 13.24% indicated their role as ‘very relevant’). Respondents that are/were involved in a current/preceding partnership indicated that industry and government (Member States and Associated Countries) are more relevant compared to other respondents.

- *Pooling and leveraging resources*

Respondents were asked to assess the relevance of different actors in pooling and leveraging resources (such as financial, infrastructure, in-kind expertise) through coordination, alignment or integration to meet Partnership objectives. The role of industry is considered as very relevant, as 104 respondents out of 154 (68%) indicated that their involvement is very relevant for the above-listed purpose. The involvement of foundations, NGOs and other stakeholders is seen as less important (respectively 25 respondents or 18% indicated the role of foundations/NGOs, and 20 respondents or 15% indicated the role of other stakeholders as very relevant).

A slight statistical difference was found between the views of citizens and other respondents. Citizens found the relevance of academia in pooling and leveraging resources through coordination, alignment or integration slightly less relevant. Similarly, respondents that are/were involved in a current/preceding partnership indicate a slightly higher relevance of industry.

- *The partnership composition*

Respondents were asked about the relevance of certain elements of the Partnership composition, such as flexibility in the composition of partners over time and involvement of a broad range of partners (including across disciplines and sectors), to reach objectives of the KDT Partnership.

A high share of respondents (117 or 77%) view that flexibility in composition of partners over time is relevant by giving a score of 4 and 5 on the indicated scale. The large majority of respondents (125 or 82%) also indicated that ensuring involvement of a broad range of partners is relevant to ensure that proposed European Partnership would meet its objectives.

- *Implementation of activities*

Respondents were asked to provide opinions on the relevance of implementation of several activities for meeting objectives of the Partnership. According to the analysis, a high number of respondents view that joint R&I programme, collaborative R&I projects, deployment and piloting of activities, as well as, co-creation of solutions with end-users is very relevant for meeting the objectives. Over 85% of respondents assessed listed activities as relevant or very relevant, giving a score of 4 and 5 on the indicated scale. In comparison, only 37 respondent out 152 (24.34%) consider that the input to regulatory aspects is very relevant for meeting objectives of the KDT Partnership.

Relevance of setting-up a specific legal structure (funding body) for the candidate European Partnership to meet objectives

Respondents were asked to assess the relevance of a specific legal structure (funding body) for the candidate European Partnership to achieve several objectives. According to the feedback, a large number of respondents suggested that setting-up a specific legal structure would be very relevant to implement activities more effectively (70 respondents or 46%), to implement activities faster to respond to sudden market or policy needs (62 respondents or 42%), to facilitate synergies with other EU and national programmes (62 respondents or 41%) and to facilitate collaboration with other relevant European Partnerships (60 respondents or 41%). On the other hand, a lower number of respondents (24 or 16%) indicated that the legal structure would be very relevant to ensure better links to regulators. Respondents that

are/were involved in a current/preceding partnership indicate a slightly higher relevance of setting up a specific legal structure to facilitate collaboration with other relevant European Partnerships.

Scope and coverage proposed for candidate institutionalised European Partnership

Respondents were asked to assess the scope and coverage proposed for the Key Digital Technology Partnership, based on its inception impact assessment. Overall, the majority of respondents consider that the scope and coverage are right in terms of technologies, research areas, geographical coverage, types of partners, range of activities and sectors. However, a significantly smaller number of respondents consider it too narrow for the research areas (22 respondents or 15%) and type of partners covered (20 respondents or 14%).

Alignment of the European Partnership with other initiatives

The majority of respondents (100 or 76%) consider that it would be possible to rationalise the candidate European Institutionalised Partnership and its activities, and/or to better link it with other comparable initiatives.

Relevance of the Candidate European Partnership to deliver impacts

Respondents were asked to assess the relevance of the candidate European Institutionalised Partnership to deliver on listed societal, economic/technological and scientific impacts.

The majority of respondents indicated that the Partnership would be ‘very relevant’ to deliver on the following societal impacts: provision of trusted electronics components and systems to the public and businesses (86 respondents or 55.84%), enabled safety - automotive, avionics, and security - transactions, communications (94 respondents or 61.44%). On the other hand, contribution to more functional, efficient, economical and accessible electronics systems was by a smaller number of respondents indicated as ‘very relevant’ (70 respondents or 46.05%).

Among economic/technological impacts that were suggested, a large number of respondents indicated that the Partnership would be ‘very relevant’ for more innovative, sustainable and globally competitive electronics and systems industries – including SMEs (95 respondents or 61.89%), and for the development and exploitation of innovative technology paradigms (80 respondents or 53.33%).

A large number of respondents, namely 102 out of 153 (66.66%), indicated that the Partnership would be ‘very relevant’ for the mentioned scientific impact: new scientific knowledge and reinforcement of EU research and innovative capabilities in Key Digital Technologies.

Summary of open question responses by non-campaign respondents

To complement and personalise further the answers to the multiple-choice questions in the Open Public Consultation, respondents were given the opportunity to provide feedback in an open-type format. The main consequent messages were:

In general, a future European Institutionalised partnership was the clear choice to bring together the critical mass of public and private resources needed to ensure Europe’s competitiveness, sovereignty and autonomy in the strategic domain of KDT and act on the

basis of an industry-driven, truly pan-European common strategy, especially in light of the success of the current ECSEL Joint Undertaking.

Some respondents preferred the options of a co-funded or co-programmed partnership, due to the low complexity level, as this would lead to higher success rates due to the dedicated work amongst partners that have collaborated in the past, whilst also providing a relational flexibility among eligible stakeholders to participate in a European project. With a view to SME access in such programs, playing a key part in the innovation development, it is the opinion that co-fund or co-programmed has proven to be successful in attracting interest towards open innovation.

For others, traditional calls were the preferred option, due to their familiarity. It is the opinion that the introduction of new rules, model agreements, procedures etc. would put participants in another learning curve. From the long line of framework programmes, they have shown that they offer simplicity, functionality and high potential of collaboration and results.

Respondents also noted that, experience from the current partnership in this domain has illustrated a further need to extend R&I efforts to related aspects of technologies. Some respondents also noted that cybersecurity, should be part of the future partnership on key digital technologies. Addressing lower technology readiness levels, would also provide the ability to innovate and address the unprecedented complexity of future digital technologies, requiring dedicated research efforts and collaboration across multiple industrial and academic domains.

Finally, as the majority of respondents agreed on the technological scope of the KDT partnership, it was also highlighted that these technologies and applications would act as main drivers in the digital transformation of the European economy and society.

Summary of campaign responses

Further to this, a single campaign (campaign #10 – 20 respondents) was identified for the current candidate Partnership. The participants of the campaign were strongly in favour of an institutionalised partnership.

An overview of the campaign responses can be seen in table 1.

Table 1: Overview of responses of campaign participants

Question category	Summary of responses
Research and innovation problems	All categories are considered mostly 'very relevant' (score 5).
Structural and resource problems	The categories "Limited availability of testbeds for novel computing components and systems" and "Sky-rocketing costs of equipment" are considered 'relevant' (score 4) and 'very relevant' (score 5). In contrast, "Limited collaboration and pooling of resources between Member States, European Commission, Industry and Research organisations (Universities, RTOs)" received an average score.
Problems in uptake of digital innovations	The category "Insufficient market size or inappropriate business models" is considered 'relevant', while other categories in this group of questions received a low score (namely, 2 and 3).
Preferred Horizon Europe intervention	Institutionalised Partnership was selected by all respondents. When respondents were asked to explain their choice, all of them used the following quote: "Only an institutionalised European Partnership based on Article 187 TFEU will bring together the critical mass of public

	<i>and private resources needed to ensure Europe's competitiveness, sovereignty and autonomy in the strategic domain of KDT and act on the basis of an industry-driven, truly pan-European common strategy. A JU will create a long-term dedicated implementing structure representing the deepest level of integration, engagement and up-front commitment from public and private partners".</i>
Relevance of actors for setting joint long-term agenda	Involvement of Member States and Associated Countries, Industry and Academic is considered 'very relevant' by all respondents, while other categories received a low score (namely, 2 or 3).
Relevance of actors for pooling and leveraging resources	Involvement of Member States and Associated Countries, Industry and Academic is considered 'very relevant' by almost all respondents, while other categories received a low score (namely, 2 or 3).
Partnership composition	Mostly low score (on average, 3) on both answer categories ("Flexibility in the composition of partners over time" and "Involvement of a broad range of partners, including across disciplines and sectors").
Implementation of activities	Joint R&I programme, collaboration R&D projects and deployment, piloting activities, and co-creation of solutions with end-users are considered 'very relevant' and 'relevant' by most respondents. In contrast, "input to regulatory aspects" received a low score.
Relevance of the legal structure	Most answer categories received a high score with exception of "ensure better links to regulators", "ensure better links to practitioners on the ground" and "ensure harmonisation of standards and approaches".
Scope and coverage of the candidate Partnership	<p>Almost all respondents considered that listed components of the candidate Partnership have right scope and coverage.</p> <p>Respondents were offered an opportunity to provide comments on the proposed scope and coverage of the Institutionalised Partnership. Several of them included the following quote: <i>"Experience from ECSEL has illustrated a need to extend R&I efforts to related aspects of photonics and software, advanced computing technologies (such as neuromorphic computing and edge computing), biosensors and flexible electronics, all of which are featuring increasingly in the digital transformation of the economy and society and now need to be co-integrated to build complex systems and open up new avenues of application".</i></p>
Rationalisation of the candidate Partnership and linking to other initiatives	<p>Respondents consider that it would not be possible to rationalise the candidate Partnership and its activities, and/or to better link it with other comparable initiatives.</p> <p>Respondents were asked to explain their answer, most of them inserted a following quote: <i>"The technologies of the KDT partnership and their applications will be key in addressing multiple global challenges such as transport & smart mobility, health & wellbeing, energy, digital industry and digital life, as well as driving the digital transformation of multiple sectors of Europe's economy and society. Whereas the KDT partnership will collaborate closely with comparable initiatives focusing on one specific challenge or sector, it cannot be linked or merged with only one of them".</i></p>
Societal impact	Almost all respondents considered that the candidate Partnership would be 'very relevant' to deliver on listed impacts.
Economic/technological impact	Almost all respondents considered that the candidate Partnership would be 'very relevant' to deliver on listed impacts.
Scientific impact	All respondents considered that the candidate Partnership would be 'very relevant' to deliver on listed impacts.

1.3.7. Interviews (IA Study)

As part of the stakeholder consultation efforts, the impact assessment study on the candidate partnership performed interviews with a carefully balanced sample of relevant stakeholders covering five different categories. In summary, 51 stakeholders have been interviewed in the

framework of this partnership: around one third of interviews were conducted with large companies (31%), followed by industry associations (25%), RTOs and universities (14%), Member States (14%), SMEs (12%) and European Commission services (4%). Concerning geographical location, around half were from Western Europe (49%), followed by Eastern Europe (10%), Southern Europe (8%), the Nordics (4%) and international (6%). Finally, gender balance was at 76.5% male and 23.5% female.

The interviews were required to cover, among others, research, development, supply and end-user organisations as well as representatives from the KDT value chain, from equipment, design and production to systems integration and end-product. The segments sought covered, for example, electronics, semiconductors, foundries, systems, software, application areas (automotive, MedTech, energy, manufacturing, etc.), engineering and photonics. To obtain information about the envisaged set up and measures, it was equally sought to carry out interviews with executive level and board members of the current JU, in addition to Member State representatives, to scope the opinions and interest.

These interviews confirmed the strong need for a partnership in this domain, in line with the outcome of the open public consultation analysis. As it was apparent overall, the preferred option would be that of an Institutionalised Partnership (option 3), given its ability to ensure commitment of industry and MS around a strategic agenda, alignment with industry strategies, coordination of research agendas and mobilisation of funding. This appears to be linked to the existence of the current ECSEL JU, which was also successful in a form equivalent to an Institutionalised Partnership.

Option 0 – Traditional Calls

Interviewees mainly from MS, business organisations and RTOs supported the conclusion that traditional calls are effective in generating scientific impact and in targeting lower TRLs. However, it was also pointed out by MS and industry associations that traditional calls are less suited for aligning with the industrial demand/user side or in generating scientific impact in areas aligned with industry needs. Some interviewees also highlighted that calls are unlikely to mobilise a level of investment equivalent to other options, for example given the absence of national funding. In this context, the lack of formal mechanism of commitment and uncertainty concerning the level of financial contribution by industry was highlighted.

According to interviewees, traditional calls have a relatively low capacity to ensure long-term commitment, leverage resources and to build upon results of previous projects, thereby restricting it from strengthening technological leadership and competitiveness of Europe's KDT industry. This would require the alignment of strategies and coordination, something which traditional calls cannot deliver according to several interviewed organisations.

Option 1 - Co-programmed partnership

In general, the co-programmed partnership was found to allow for a high level of flexibility and agility in the organisation and involvement, while also having the capacity to facilitate commitment from both public and private partners as well as mobilise funding. In comparison to traditional calls, it was found to have a more aligned format to industry needs combined with a high level of flexibility and openness – both perceived to be conducive to achieving technological and industrial impact.

Option 3 - Institutionalised Partnership

Overall it was emphasised that an Institutionalised Partnership is mostly capable of addressing and building the KDT ecosystem and value chains, with a long term perspective on coordination and collaboration, supportive in addressing fragmentation and strengthening integration and cooperation in European value chains. Moreover, an Institutional Partnership is likely to contain a broad coverage of TRLs, thereby providing a broad coverage of the value chain. The tripartite nature and centralised structure of an Institutionalised Partnership offers a strong incentive for making synchronised funding decisions taking into account national and industry developments.

Through this partnership option, the alignment with the EU policy is ensured by the participation of the EC in the management of the partnership, according to the interviewees. The calls are designed by the management of the partnership according to the work programme with the highest possible alignment with the industry's strategy. The central coordination of the selection of the projects will result in a stronger and more coherent research portfolio. Therefore, the potential to achieve the required directionality is high. By comprising a centralised coordination and management, it is anticipated to provide a higher level of internal coherence.

It was also mentioned that the Institutional Partnership has a long-term perspective on collaboration and accordingly more effective in strengthening the exchange of knowledge within the value networks, given that traditional calls limit participation in a single project with low possibilities for continuation of the collaboration in follow-up calls.

Several interviewees highlighted that this partnership option has the highest relevance for achieving industrial impact and competitiveness and for developing strategic technologies; this viewpoint is based on that the option provides the strongest type of commitment, long-term stability and critical mass. It offers a better format for addressing alignment and ensuring coordination, relevant for agreeing on priorities of technological importance and for achieving technological sovereignty.

An Institutionalised Partnership has a relatively high capacity to ensure coordination and alignment with other national and European policies in the field, as stated by interviewees, also indicating potential links in relation to key application areas, such as automotive, energy, health, manufacturing and mobility/transport, in need of KDT solutions.

Annex 3 Who is affected and how?

1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

This annex describes the practical implications of the preferred option identified in the Impact Assessment: the establishment of an institutionalised partnership based on Article 187 to support and reinforce Europe's industrial, technological and innovation capacities in Key Digital Technologies, for directly or indirectly affected stakeholder groups.

2. SUMMARY OF COSTS AND BENEFITS

Overview of benefits (for all stakeholder groups)

Member States

The preferred option will provide the means to build up research, innovation and production capabilities in Key Digital Technologies, where no single Member State would have the industrial or economic potential to achieve similar results on its own.

The institutionalised partnership will not only enhance the investments at European level, but also make their returns proportionally higher, as the access to upgraded facilities starts to bear fruit. Additionally, funding through the partnership will stimulate MS support to KDT industry through appropriated instrument(s) such as IPCEI.

The initiative will allow Member States to anticipate requirements early enough in order to facilitate the deployment of key digital technologies at national and European levels. An effective tri-partite model will provide for greater synergies between the Member States, the Commission and the private sector and enable implementing a clear strategy for the sector at European level and merging expertise and resources to develop the necessary means and infrastructures, what would otherwise bear the cost or require effort, exceeding capacity of a single Member State.

The increased coherence and synergies between different funding mechanisms (Horizon Europe, Digital Europe Program, PENTA¹⁰ and IPCEI) would also have a positive impact on the efficiency of the EU budget to which Member States contribute, with an evident reduction of the fragmentation of research effort.

Businesses

European companies at large, both from the demand and supply side of nanoelectronics, embedded intelligent systems, smart system integration, semiconductor manufacturing, photonics and integrated software will be among the most affected stakeholder groups. Key companies from vertical application areas (transport and mobility, communications, manufacturing, health & care, energy, to name a few) will complement this comprehensive demand-supply approach, which will cover the value chains in full. With such an ambition, cross-industry cooperation will combine hardware and software, design and manufacturing

¹⁰ PENTA is a EUREKA initiative launched in 2016 to replace CATRENE with the aim to catalyse research, development and innovation in the areas of micro and nanoelectronics enabled systems and applications where there is shared high national and industrial interest.

and provide a basis for collaborative work, whilst creating ecosystems along the relevant value and supply chains.

Further to this, research efforts aiming directly at industrial needs will benefit from such a collaboration between research and industry, which will indirectly support the deployment of European leading-edge KDT products and solutions across the market.

SMEs

SMEs are the key players in emerging and less established key digital technologies. They will thus experience direct and indirect economic benefits from the initiative. The KDT partnership will open up opportunities to SMEs with a more tailored implementing structure, as research topics clearly become more market oriented. The cost of designing new products will decrease, since SMEs, which usually lack or look outside of their current market for the necessary infrastructure and resources, will gain easier access – through co-participation of large industrial actors - to a high-level scientific capacity, manufacturing equipment and materials. It is also expected that this initiative will open up new product and application markets for European SMEs active in the field of KDT, as novel computing paradigms (neuromorphic), AI and related software, support.

Research community

European research and development organisations, both on the supply and demand side, will benefit from improved coordination, pooling of resources and greater access to advanced methodologies and tools, such as pilot lines and platforms and testing and experimentation facilities, supported by the partnership. They will be able to attain the critical mass for longer-term projects of common strategic interest and perspective. Furthermore, the institutionalised partnership option will ensure coordination between research and industry, resulting in new technologies, devices and systems, and ensuring that a broad scope of innovations benefit from standardisation of underlying technologies, thus bringing down the costs of reaching the market. The tri-partite dimension will help the research community to accurately direct efforts towards concrete industrial needs, introducing applicable and marketable solutions that various industries and public authorities can easily take up. The research community would also experience cross-fertilisation amongst the various KDT stakeholder groups under the common overarching focus of several EU research programmes, as researchers learn about new avenues to pursue and developers learn about new possibilities for products. Creating the necessary conditions, via the partnership, to enhance every aspect of KDT research, will in turn give further visibility to the already globally leading EU excellence.

Citizens

Citizens will benefit from the institutionalised partnership as the new solutions and products are developed and delivered to make their lives safer and easier, such as safe autonomous vehicles, seamless and secure means of communication, as well as novel healthcare techniques and devices. Enhanced European expertise in KDT will also contribute to tackling societal problems, such as climate change or ageing society, as finding solutions for them will become easier with AI enabled computing derived from the combination of efficient, powerful and trusted electronics and advanced sensors.

The technologies developed under the KDT partnership will improve energy efficiency, make use of renewable energy sources, and look at new (edge) computing paradigms for data

processing. As downstream industries, through KDT, will progressively reduce the energy consumption of their products, develop technologies and applications of higher energy efficiency, and substitute existing with more environmentally friendly materials, the positive impact on the environment and sustainability will become more and more pronounced.

EU institutions, agencies and bodies

The EU institutions, agencies and bodies will benefit both from the outcome of the research, development and strategic actions of the initiative, whilst attaining state of the art methodologies and tools for the future. Cross-links with other domains open opportunities for synergies with multiple other bodies of EU relevance, such as with partnerships targeting enabling technologies, i.e. EuroHPC, SNS, Photonics, AI data & robotics, Global competitive space system and Made in Europe, together with the EIT Digital which will contribute to the development of skills and the boosting of digital entrepreneurship.

All stakeholder groups

Overall, the preferred option will benefit all stakeholders, as it will help to deal with the complexity of the research and innovation landscape in the development of digital products/services, where no single organisation or MS can master all required technologies. The collaborative functionalities of the initiative will enable stakeholders to expand collaborations, and develop innovations, and ultimately mature, as Europe-wide KDT cutting-edge projects, pilot lines and platforms become available, retaining the best talents in the EU and attracting highly skilled professionals from third countries.

A summary of the benefits can be seen in the table below:

<i>I. Overview of Benefits (total for all provisions) – Preferred Option</i>		
<i>Description</i>	<i>Estimation (quantitative or qualitative)</i>	<i>Comments</i>
<i>Direct benefits</i>		
Build-up of KDT research, innovation and production capabilities in Europe	Combined resources would effectively address the main objectives, where no single Member or Associated State would have the industrial or economic capacity to realise on its own.	The initiative will allow Member States to anticipate requirements early enough in order to facilitate the deployment of key digital technologies at national and European levels.
Joint R&I strategy	Collaboration across the EU will enable R&I stakeholders to further build collaborations, develop new innovations, and ultimately mature, as Europe-wide KDT pilot lines and platforms become accessible.	The complexity of digital products/services entails that no single entity can master all required technologies. Research and industry organisations will benefit from such a collaboration, which will indirectly support the deployment of European leading-edge KDT products and solutions across the market.
Economic growth particularly for SMEs	SMEs would directly benefit from such a specific collaborative environment, as market oriented research topics make use of a more tailored implementing structure, with a large capacity of manufacturing equipment and materials via participation of key large industrial enterprises	EU growth in Key Digital Technologies is evident, especially for SMEs, which are the key role players in emerging and less established technologies, such as novel computing paradigms (neuromorphic), Artificial Intelligence and related software.
Societal	Citizens would benefit from the introduction of KDT in areas of interest, as safe autonomous	Addressing societal problems such as climate change or an ageing society, can be

	vehicles and seamless and secure means of communication are realised, as well as novel healthcare techniques and devices.	made easier with AI enabled computing derived from the combination of efficient, powerful, trusted electronics and advanced sensors.
Environmental	KDTs would contribute to sustainability and in protecting the environment, as technologies developed would improve energy efficiency, make use of renewable energy sources, and look at new low-power (edge) computing paradigms for data processing.	Downstream industries, through KDT, would progressively reduce the energy consumption of their products, develop technologies and applications of high energy efficiency, and substitute existing with more environmentally friendly materials.

Overview of costs – For the preferred option

With the assumption that the partnership will maintain the internal structure of the current ECSEL Joint Undertaking, it can be implicit that this option is considered closest to a ‘cost-neutral’ setup, as there is a likely continuation of the existing structure, building rental, HR, etc.

Under this assumption and in the case of JU discontinuity, the estimated cost and benefits are analysed. ECSEL statutes foresee a 4-year winding-up period to manage projects launched in the last phase of the Joint Undertaking that will be running beyond 31st December 2020. The administrative cost planned for the management of ECSEL legacy in the period 2021-24 is €10,4 million, to be equally shared by EC and industry members.

There would be also ‘intangible costs’ associated to the JU discontinuity. It will be difficult to justify a lower intensity of EU support in R&I to the components and software industry at a moment in which access in Europe to key digital technologies is becoming critical and when other regions (China, US, Korea) are receiving substantial public support that goes beyond R&I.

Finally, a tri-partite JU structure enables the mobilisation of a critical amount of resources as it supports the combined contributions of EU, Participating States and Industry.

<i>II. Overview of direct and indirect costs – Preferred option</i>							
		Citizens/Consumers		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent	One-off	Recurrent ¹¹
Management/ Administrative costs	Direct costs						Running cost €2.29 million ¹² /year (EC 50%)
	Indirect costs						
Personnel costs	Direct costs						€ 3.24 million /year - 30 full time equivalent staff (EC 50%)
	Indirect costs						
Coordination costs (or transaction costs)							

¹¹ Commitment appropriations

¹² These are the costs of running the ECSEL JU according to the 2018 Annual Activity Report.

Budget expenditure/ investment costs							
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REFIT Cost savings table

Not applicable for the proposed KDT Partnership. The initiative will benefit from the existing organisation/structure (e.g. the Programme Office) already in place for the ECSEL JU. There are no additional regulatory costs associated, and no specific simplification measures apply in this case.

Annex 4 Analytical Methods

The methodology for each impact assessment is based on the Commission Better Regulation Guidelines¹³ to evaluate and compare options with regards to their **efficiency, effectiveness and coherence**. This is complemented by integrating the **conditions and selection criteria for European Partnerships**, as well as requirements for setting up Institutionalised Partnerships.¹⁴

1. OVERVIEW OF THE METHODOLOGIES EMPLOYED

In terms of **methods and evidence used**, the set of impact assessments for all candidate Institutionalised European Partnerships draw on an external study covering all initiatives in parallel to ensure a high level of coherence and comparability of analysis¹⁵.

All impact assessments mobilised a mix of qualitative and quantitative data collection and analysis methods. These methods range from desk research and interviews to the analysis of the responses to the Open Consultation, stakeholder analysis and composition/portfolio analysis, bibliometrics/patent analysis and social network analysis, and a cost-effectiveness analysis.

The first step in the impact assessment studies consisted in the definition of the context and the problems that the candidate partnerships are expected to solve in the medium term or long run. The main data source in this respect was desk research. This includes grey and academic literature to identify the main challenges in the scientific and technologic fields and in the economic sectors relevant for the candidate partnerships, as well as the review of official documentations on the policy context for each initiative.

In the assessment of the problems to address, the lessons to be learned from past and ongoing partnerships were taken into account, especially from relevant midterm or ex-post evaluations.

The description of the context of the candidate institutionalised European Partnerships required a good understanding of the corresponding research and innovation systems and their outputs already measured. Data on past and ongoing Horizon 2020 projects, including the ones implemented through Partnerships, served as basis for descriptive statistic of the numbers of projects and their respective levels of funding, the type of organisations participating (e.g. universities, RTOs, large enterprises, SMEs, public administrations, NGOs, etc.) and how the funding was distributed across them. Special attention was given to analysing the participating countries (and groups of countries, such as EU, Associated Countries, EU13 or EU15) and industrial sectors, where relevant. The sectoral analysis required enriching the eCORDA data received from the European Commission services with sector information extracted from ORBIS, using the NACE codification up to level 2. These data enabled the identification of the main and, where possible, emerging actors in the relevant systems, i.e. the organisations, countries and sectors that would need to be involved (further) in a new initiative.

¹³ European Commission (2017), Better Regulation Guidelines (SWD (2017) 350)

¹⁴ A pivotal element of the present analysis is the so-called two-step ‘necessity test’ for European Partnerships, used to establish: step 1) the need for a partnership approach in the first place, followed by step 2) a justification for the form of Institutionalised Partnership. The necessity test is described in Annex 6. This impact assessment focuses on the second step of the test.

¹⁵ Technopolis Group (2020), Impact Assessment Study for Institutionalised European Partnerships under Horizon Europe.

A Social Network Analysis was performed by the contractors using the same data. It consisted in mapping the collaboration between the participants in the projects funded under the ongoing R&I partnerships. This analysis revealed which actors – broken down per type of stakeholders or per industrial sector – collaborate the most often together, and those that are therefore the most central to the relevant research and innovation systems.

The data provided finally served a bibliometric analysis run by the contractor aimed at measuring the outputs (patents and scientific publications) of the currently EU-funded research and innovation projects. A complementary analysis of the Scopus data enabled to determine the position and excellence of the European Union on the international scene, and identify who its main competitors are, and whether the European research and innovation is leading, following or lagging behind.

A cost modelling exercise was performed in order to feed into the efficiency assessments of the partnership options.

The conclusions drawn from the data analysis were confronted to the views of experts and stakeholders collected via three means:

- The comments to the inception impact assessments of the individual candidate institutionalised European Partnerships;
- The open public consultation organised by the European Commission from September to November 2019;
- The interviews (up to 50) conducted by each impact assessment study team conducted between August 2019 and January 2020 (policymakers, business including SMEs and business associations, research institutes and universities, and civil organisations, among others).

The views of stakeholders (and experts) were particularly important for determining the basic functionalities (see further below) that the future partnerships need to demonstrate to achieve their objectives as well as their most anticipated scientific, economic and technological, and societal impacts. The interviews allowed more flexibility to ask the respondents to reflect about the different types of European Partnerships. Furthermore, as a method for targeted consultation, it was used to get insights from the actors that both the Study Teams and the European Commission were deemed the most relevant. For the comparative assessment of impacts, the external contractors confronted the outcomes of the different stakeholder consultation exercises to each other with a view of increasing the validity of their conclusions, in line with the principles of triangulation.

Annex 2 includes also the main outcomes of the stakeholder consultation exercises.

2. METHOD FOR ASSESSING THE EFFECTIVENESS, EFFICIENCY AND COHERENCE OF EACH OPTION - THE USE OF FUNCTIONALITIES

Given the focus of the impact assessment on comparing different forms of implementation, the Better Regulation framework has been adapted to introduce “**key functionalities needed**” – so as to link the intended objectives of the candidate European Partnerships and what would be crucial to achieve them *in terms of implementation*. The identification of “key functionalities needed” for each initiative as an additional step in the impact assessment is based on the distinguishing factors between the different options (see Section 2.2.1 in the main body of the impact assessment). In practical terms, each option is assessed on the basis of the degree to which it would allow for the key needed functionalities to be covered, as

regards e.g. the type and composition of actors that can be involved ('openness'), the range of activities that can be performed (including additionality and level of integration), the level of directionality and integration of R&I strategies; the possibilities offered for coherence and synergies with other components of Horizon Europe, including other Partnerships (internal coherence), and the coherence with the wider policy environments, including with the relevant regulatory and standardisation framework (external coherence). This approach guides the identification of discarded options. It also allows for a structured comparison of the options as regards their effectiveness, efficiency and coherence, and also against a set of other key selection criteria for European Partnerships (openness, transparency, directionality)¹⁶.

Figure 3 Overview of key functionalities of each form of implementation of European Partnerships

Baseline: Horizon Europe calls	Option 1: Co-programmed	Option 2: Co-funded	Option 3.1: Institutionalised Article 185	Option 3.2: Institutionalised Article 187
Type and composition of actors (including openness and roles)				
<u>Partners:</u> N.A., no common set of actors that engage in planning and implementation <u>Priority setting:</u> open to all, part of Horizon Europe Strategic planning <u>Participation in R&I activities:</u> fully open in line with standard Horizon Europe rules	<u>Partners:</u> Suitable for all types: private and/or public partners, foundations <u>Priority setting:</u> Driven by partners, open stakeholder consultation, MS in comitology <u>Participation in R&I activities:</u> fully open in line with standard Horizon Europe rules	<u>Partners:</u> core of national funding bodies or governmental research organisations <u>Priority setting:</u> Driven by partners, open stakeholder consultation <u>Participation in R&I activities:</u> limited, according to national rules of partner countries	<u>Partners:</u> National funding bodies or governmental research organisation <u>Priority setting:</u> Driven by partners, open stakeholder consultation <u>Participation in R&I activities:</u> fully open in line with standard Horizon Europe rules, but possible derogations	<u>Partners:</u> Suitable for all types: private and/or public partners, foundations <u>Priority setting:</u> Driven by partners, open stakeholder consultation <u>Participation in R&I activities:</u> fully open in line with standard Horizon Europe rules, but possible derogations
Type and range of activities (including additionality and level of integration)				
<u>Activities:</u> Horizon Europe standards that allow broad range of individual actions <u>Additionality:</u> no additional activities and investments outside the funded projects <u>Limitations:</u> No systemic approach beyond individual actions	<u>Activities:</u> Horizon Europe standard actions that allow broad range of individual actions, support to market, regulatory or policy/ societal uptake <u>Additionality:</u> Activities/investment s of partners, National funding <u>Limitations:</u> Limited systemic approach beyond individual actions.	<u>Activities:</u> Broad, according to rules/programmes of participating States, State-aid rules, support to regulatory or policy/ societal uptake <u>Additionality:</u> National funding <u>Limitations:</u> Scale and scope depend on the participating programmes, often smaller in scale	<u>Activities:</u> Horizon Europe standards that allow broad range of individual actions, support to regulatory or policy/societal uptake, possibility to systemic approach <u>Additionality:</u> National funding	<u>Activities:</u> Horizon Europe standards that allow broad range of individual actions, support to regulatory or policy/societal uptake, possibility to systemic approach (portfolios of projects, scaling up of results, synergies with other funds). <u>Additionality:</u> Activities/investments of partners/ national funding
Directionality				
<u>Priority setting:</u> Strategic Plan and	<u>Priority setting:</u> Strategic R&I	<u>Priority setting:</u> Strategic R&I	<u>Priority setting:</u> Strategic R&I	<u>Priority setting:</u> Strategic R&I

¹⁶ The criterion on the ex-ante demonstration of partners' long term commitment depends on a series of factors that are unknown at this stage, and thus fall outside the scope of the analysis.

Baseline: Horizon Europe calls	Option 1: Co-programmed	Option 2: Co-funded	Option 3.1: Institutionalised Article 185	Option 3.2: Institutionalised Article 187
annual work programmes, covering max. 4 years. <u>Limitations:</u> Fully taking into account existing or to be developed SRIA/roadmap	agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution Input to FP annual work programme drafted by partners, finalised by COM (comitology) Objectives and commitments are set in the contractual arrangement.	agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution Annual work programme drafted by partners, approved by COM Objectives and commitments are set in the Grant Agreement.	agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution Annual work programme drafted by partners, approved by COM Objectives and commitments are set in the legal base.	agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution Annual work programme drafted by partners, approved by COM (veto-right in governance) Objectives and commitments are set in the legal base.
Coherence: internal (Horizon Europe) and external (other Union programmes, national programmes, industrial strategies)				
<u>Internal:</u> Between different parts of the Annual Work programme can be ensured by COM <u>External:</u> Limited for other Union programmes, no synergies with national/regional programmes and activities	<u>Internal:</u> Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM <u>External:</u> Limited synergies with other Union programmes and industrial strategies If MS participate, with national/regional programmes and activities	<u>Internal:</u> Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM <u>External:</u> Synergies with national/regional programmes and activities	<u>Internal:</u> Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM <u>External:</u> Synergies with national/regional programmes and activities	<u>Internal:</u> Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM <u>External:</u> Synergies with other Union programmes and industrial strategies If MS participate, with national/regional programmes and activities

In line with the Better Regulation Framework, the assessment of the effectiveness, efficiency and coherence of each option is made in comparison to the baseline. Therefore, for each of the above criteria, the performance of using traditional calls under Horizon Europe is first estimated and scored 0 to serve as a reference point. When relevant, this estimation also includes the costs/benefits of discontinuing existing implementation structures. The policy options are then scored compared to the baseline with a + and – system along a two-point scale, to indicate limited (+ or -) or high (++ or --) additional/lower performance compared to the baseline. When a policy option is scored 0, this means that its impact is expected to be roughly equal to the baseline option.

On the basis of the evidence collected, the intervention logic of each initiative and the key functionalities needed, the impact assessments first evaluate the **effectiveness** of the various policy options to deliver on their objectives. To be in line with the Horizon Europe impact framework, the fulfilment of the specific objectives of the initiative is translated into ‘expected impacts’ - how success would look like -, differentiating between scientific, economic/ technological, and societal (including environmental) impacts. Each impact

assessment considers to which extent the different policy options provides the ‘key functionalities needed’ to achieve the intended objectives. The effectiveness assessment does not use a compound score but shows how the options would deliver on the different types of expected impacts. This is done to increase transparency and accuracy in the assessment of options¹⁷.

A similar approach is followed to evaluate the coherence of options with the overarching objectives of the EU’s R&I policy, and distinguishes between **internal** and **external coherence**. Specifically, internal coherence covers the consistency of the activities that could be implemented with the rest of Horizon Europe, including European Partnerships (any type). External coherence refers to the potential for synergies and/or complementarities (including risks of overlaps/gaps) of the initiative with its external environment, including with other programmes under the MFF 2021-27, but also the framework conditions at European, national or regional level (incl. regulatory aspects, standardisation).

To compare the expected costs and benefits of each option (**efficiency**), the thematic impact assessments broadly follow a cost-effectiveness approach¹⁸ to establish to which extent the intended objectives can be achieved for a given cost. A preliminary step in this process is to obtain a measure of the expected costs of the policy options, to be used in the thematic assessments. As the options correspond to different implementation modes, relevant cost categories generally include the costs of setting-up and running an initiative. For instance, set-up costs includes items such as the preparation of a European Partnership proposal and the preparation of an implementation structure. The running costs include the annual work programme preparation costs. Where a Partnership already exists, discontinuation costs and cost-savings are also taken into account¹⁹. The table below provides an overview of the cost categories used in the impact assessment and a qualitative scoring of their intensity when compared to the baseline option (traditional calls). Providing a monetised value for these average static costs would have been misleading, because of the different features and needs of each candidate initiative.²⁰ The table shows the overall administrative, operational and coordination costs of the various options. These costs are then put into context in the impact assessments to reflect the expected co-financing rates and the total budget available for each of the policy options, assuming a common Union contribution (cost-efficiency):

- The costs related to the baseline scenario (traditional calls under Horizon Europe) are pre-dominantly the costs of implementing the respective Union contribution via calls and project, managed by the executive agencies (around 4%, efficiency of 96% for the overall investment).
- For a Co-Programmed partnership the costs of preparation and implementation

¹⁷ In the thematic impact assessments, scores are justified in a detailed manner to avoid arbitrariness and spurious accuracy. A qualitative or even quantitative explanation is provided of why certain scores were given to specific impacts, and why one option scores better or worse than others.

¹⁸ For further details, see Better Regulation Toolbox # 57.

¹⁹ Discontinuation costs will bear winding down and social discontinuation costs and vary depending on e.g. the number of full-time-equivalent (FTEs) staff concerned, the type of contract (staff category and duration) and applicable rules on termination (e.g. contracts under Belgian law or other). If buildings are being rented, the cost of rental termination also apply. As rental contracts are normally tied to the expected duration of the current initiatives, these termination costs are likely to be very limited. In parallel, there would also be financial cost-savings related to the closing of the structure, related to operations, staff and coordination costs in particular. This is developed further in the individual efficiency assessments.

²⁰ A complete presentation of the methodology developed to assess costs as well as the sources used is described in the external study supporting this impact assessment (Technopolis Group, 2020).

increase only marginally compared to the baseline (<1%),²¹ but lead to an additional R&I investment of at least the same amount than the Union contribution²² (efficiency of 98% for the overall investment).

- For a Co-Funded partnership the additional R&I investment by Member States accounts for 2,3 times the Union contribution²³. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the national programmes, can be estimated at 6% of the Union contribution (efficiency of 98% related to the overall investment).²⁴
- For an Article 185 initiative the additional R&I investment by Member States is equal to the Union contribution²⁵. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the dedicated implementation structure, can be estimated at 7% of the Union contribution (efficiency of 96% related to the overall investment).
- For an Article 187 initiative the additional R&I investment by partners is equal to the Union contribution²⁶. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the dedicated implementation structure, can be estimated at 9% of the Union contribution (efficiency of 94% related to the overall investment).

Figure 4 - Intensity of additional costs compared with Horizon Europe Calls (for Partners, stakeholders, public and EU)

Cost items	Baseline: traditional calls	Option 1: Co-programmed	Option 2 Co-funded	Option 3a - Art. 185	Option 3b -Art. 187
Preparation and set-up costs					
Preparation of a partnership proposal (partners and EC)	0		↑↑		
Set-up of a dedicated implementation structure		0		Existing: ↑ New: ↑↑	Existing: ↑↑ New: ↑↑↑
Preparation of the SRIA / roadmap	0		↑↑		
Ex-ante Impact Assessment for partnership		0		↑↑↑	
Preparation of EC proposal and negotiation		0		↑↑↑	
Running costs (Annual cycle of implementation)					
Annual Work Programme preparation	0		↑		
Call and project implementation	0	0 In case of MS contributions: ↑	↑	↑	↑
Cost to applicants	Comparable, unless there are strong arguments of major differences in oversubscription				

²¹ Specifically, some additional set-up costs linked for example to the creation of a strategic research and innovation agenda (SRIA) and additional running costs linked with the partners role in the creation of the annual work programmes and the Commission's additional supervisory responsibilities. A CPP will have lower overall costs than each of the other types of European Partnership, as it will function with a smaller governance and implementation structure than will be required for a Co-Funded Partnership or an Institutionalised Partnership and – related to this – its calls will be operated through the existing HEU agencies and RDI infrastructure and systems.

²² Minimum contributions from partners equal to the Union contribution.

²³ Based on the default funding rate for programme co-fund actions of 30%, partners contribute with 70% of the total investment.

²⁴ These costs reflect set-up costs and additional running costs for partners, and the Commission, of the distributed, multi-agency implementation model.

²⁵ Based on the minimum requirement in the legal basis that partners contribute at least 50% of the budget.

²⁶ Based on the minimum requirement in the legal basis that partners contribute at least 50% of the budget.

Cost items	Baseline: traditional calls	Option 1: Co-programmed	Option 2 Co-funded	Option 3a - Art. 185	Option 3b -Art. 187
Partners costs not covered by the above	0	↑	0	↑	↑
Additional EC costs (e.g. supervision)	0	↑	↑	↑	↑↑
Winding down costs					
EC	0				↑↑↑
Partners	0	↑	0	↑	↑

Notes: 0: no additional costs, as compared with the baseline; ↑: minor additional costs, as compared with the baseline; ↑↑: medium additional costs, as compared with the baseline; ↑↑↑: higher costs, as compared with the baseline.

The cost categories estimated for the common model are then used to develop a scorecard analysis and further refine the assessment of options for each of the 12 candidate Institutionalised Partnerships. Specifically, the scores related to the set-up and implementation costs are used in the thematic impact assessments to consider the scale of the expected benefits and thereby allow a simple “value for money” analysis (**cost-effectiveness**). In carrying out the scoring of options, the results of fieldwork, desk research and stakeholder consultation undertaken and taken into account.

3. METHOD FOR IDENTIFYING THE PREFERRED OPTION – THE SCORECARD ANALYSIS

For the **identification of the preferred option**, a scorecard analysis is used to build a hierarchy of the options by individual criterion and overall in order to identify a single preferred policy option or in case of an inconclusive comparison of options, a number of ‘retained’ options or hybrid. This exercise supports the systematic appraisal of alternative options across multiple types of monetary, non-monetary and qualitative dimensions. It also allows for easy visualisation of the pros and cons of each option. Each option is attributed a score of the adjudged performance against each criterion with the three broad appraisal dimensions of effectiveness, efficiency and coherence.

This scorecard approach also relies on a standard cost model developed for the external study supporting the impact assessment, as illustrated in Figure 5. Specifically, the scores related to the set-up and implementation costs are used in the thematic impact assessments to consider the scale of the expected benefits and thereby allow a simple “value for money” analysis (**cost-effectiveness**). In carrying out the scoring of options, the results of fieldwork, desk research and stakeholder consultation undertaken and taken into account.

These costs essentially refer to the administrative, operational and coordination costs of the various options. The figure shows how the scoring of costs range from a value of 0, in case an option does not entail any additional costs compared to the baseline (traditional calls), to a score of (-) for options introducing limited additional costs relative to the baseline and a score of (- -) when substantial additional costs are expected in comparison with the baseline. Should the costs of a policy option be lower than those of the baseline, (+) and (+ +) are used.

It is considered that while there is a clear gradation in the overall costs of the policy options, the cost differentials are less marked when one takes into account the expected co-financing rates and the total budget available for each of the policy options, assuming a common Union contribution. From this perspective, there are only one or two percentage points that split the most cost-efficient policy options – the baseline (traditional calls) and the Co-Programmed policy options – and the least cost-efficient – the Institutionalised Partnership option. A score of + is therefore assigned for **cost-efficiency** to the Co-Programmed and Co-Funded options,

a score of 0 to the Article 185 option and a score of (-) for the Article 187 Institutionalised Partnership policy option²⁷.

Figure 5: Matrix on ‘overall costs’ and ‘adjusted cost scoring’

	Baseline: Horizon Europe calls	Option 1: Co- programmed	Option 2: Co- funded	Option 3a: Institutionalised 185	Option 3b: Institutionalised 187
Administrative, operational and coordination costs	0	(0)	(-)	(- -)	(- -)
Administrative, operational and coordination costs adjusted per expected co-funding (i.e. <i>cost-efficiency</i>)	0	(+)	(+)	(0)	(-)

Notes: Score 0 = same costs as for the baseline; score (-) = limited additional costs compared to baseline; score (- -) = substantial additional costs compared to baseline. ; score (+) = lower costs compared to baseline

²⁷ The baseline (traditional calls) is scored 0, as explained above.

1. Can the Union act? What is the legal basis and competence of the Unions' intended action?

1.1 Which article(s) of the Treaty are used to support the legislative proposal or policy initiative?

This proposal is based on (1) Article 185 TFEU which stipulates that in implementing the multiannual framework programme, the Union may make provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes; and (2) Article 187 TFEU according to which the Union may set up joint undertakings or any other structure necessary for the efficient execution of Union research, technological development and demonstration programmes (both Articles are under Title XIX of the TFEU - Research and Technological Development and Space).

The proposal aims to implement Article 8 of the Commission proposal for Horizon Europe - the future EU research and innovation (R&I) programme for 2021-2027, according to which, *“European Partnerships shall be established for addressing European or global challenges only in cases where they will more effectively achieve objectives of Horizon Europe than the Union alone and when compared to other forms of support of the Framework programme”*. The Horizon Europe proposal has received the political agreement of the Council and the European Parliament.

1.2 Is the Union competence represented by this Treaty article exclusive, shared or supporting in nature?

Research is a shared competence between the EU and its Member States according to the TFEU. Article 4 (3) specifies that in the areas of research, technological development and space, the European Union can carry out specific activities, including defining and implementing programmes, without prejudice to the Member States' freedom to act in the same areas.

*Subsidiarity does not apply for policy areas where the Union has **exclusive** competence as defined in Article 3 TFEU²⁸. It is the specific legal basis which determines whether the proposal falls under the subsidiarity control mechanism. Article 4 TFEU²⁹ sets out the areas where competence is shared between the Union and the Member States. Article 6 TFEU³⁰ sets out the areas for which the Unions has competence only to support the actions of the Member States.*

²⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E003&from=EN>

²⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E004&from=EN>

³⁰ <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12008E006:EN:HTML>

2. Subsidiarity Principle: Why should the EU act?

2.1 Does the proposal fulfil the procedural requirements of Protocol No. 2³¹:

- Has there been a wide consultation before proposing the act?
- Is there a detailed statement with qualitative and, where possible, quantitative indicators allowing an appraisal of whether the action can best be achieved at Union level?

This proposal and the accompanying impact assessment were supported by a wide consultation of stakeholders, both during the preparation of the Horizon Europe proposal and - later on, all the candidates for European Partnerships. Member States were consulted via the Shadow Strategic configuration of the Horizon Europe Programme Committee. On candidates for institutionalised Partnerships based on Article 185/187 of the TFEU, an Open Public Consultation (OPC) was held between 11 September and 6 November 2019. Over 1 600 replies were received. In addition, targeted consultation activities were undertaken to prepare the present impact assessment. In particular, for each of the candidate partnerships, an external consultant interviewed a representative sample of stakeholders. The need for EU action as well as its added value were covered in those interviews.

The explanatory memorandum and the impact assessment (horizontal part, Section 3) contain a dedicated section on the principle of subsidiarity, as explained in question 2.2 below.

2.2 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the conformity with the principle of subsidiarity?

The impact assessment accompanying the proposal features a horizontal part on relevant common elements to all the candidate partnerships, including the conformity of the proposed initiative with the principle of subsidiarity (Section 3). Moreover, the individual assessments of each candidate partnership include additional details on subsidiarity, touching in particular on the specificities of a candidate partnership that could not be adequately reflected in the horizontal part of the impact assessment. This will also be reflected in the explanatory memorandum.

2.3 Based on the answers to the questions below, can the objectives of the proposed action be achieved sufficiently by the Member States acting alone (necessity for EU action)?

National action alone cannot achieve the scale, speed and scope of support to R&I needed for the EU to meet its long-term Treaty objectives, to deliver on the EU's strategic policy priorities (including the climate and energy goals set out in the Paris Agreement, and the European Green Deal), and to contribute to tackling global challenges and meeting the

³¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12016E/PRO/02&from=EN>

Sustainable Development Goals (SDGs).
(a) Are there significant/appreciable transnational/cross-border aspects to the problems being tackled? Have these been quantified?
<p>The thematic areas covered by the candidate partnerships feature a series of challenges in terms of cross-border/transnational aspects, need to pool resources, need for a critical mass to meet intended policy objectives, need to coordinate different types of actors (e.g. academia, industry, national and regional authorities) across different sectors of the economy and society, which cannot be tackled to the same degree by Member States alone. This is particularly true for the research and innovation (R&I) dimension of the proposed initiative: the importance of a multi-centre and interdisciplinary approach, cross-country data collection and research, and the need to develop and share new knowledge in a timely and coordinated manner to avoid duplication of efforts are key to achieve high quality results and impact. The Interim Evaluation of Horizon 2020 and the impact assessment of Horizon Europe provide extensive qualitative and quantitative evidence on the above points. In addition, Sections 1 and 2 of the individual impact assessments on the candidate partnerships include more detail on the necessity to act at EU-level in specific thematic areas. Finally, it is worth noting that not all Member States have the same capacity or R&I intensity to act on these challenges. As the desired policy objectives can be fully achieved only if the intended benefits are widespread across the Member States, this requires action at the EU-level.</p>
(b) Would national action or the absence of the EU level action conflict with core objectives of the Treaty ³² or significantly damage the interests of other Member States?
<p>As per Article 4(3) TFEU, national action does not conflict with core objectives of the Treaty in the area of R&I. The absence of EU level action in this area would however prevent the achievement of core objectives of the Treaty. Indeed, national action alone cannot achieve the scale, speed and scope of support to R&I needed for the EU to meet its long-term Treaty objectives on e.g. competitiveness, to deliver on the EU's strategic policy priorities, and to contribute to tackling global challenges and meet the Sustainable Development Goals (SDGs).</p>
(c) To what extent do Member States have the ability or possibility to enact appropriate measures?
<p>As foreseen by Article 4(3) TFEU, this proposal does not hamper Member States' ability to enact appropriate measures in the field of R&I. However, the scale and complexity of the policy objectives pursued by the present initiative cannot be fully addressed by acting at national level alone.</p>
(d) How does the problem and its causes (e.g. negative externalities, spill-over effects) vary across the national, regional and local levels of the EU?

³² https://europa.eu/european-union/about-eu/eu-in-brief_en

As described in the horizontal part of the impact assessment accompanying the present proposal, several problems (e.g. on competitiveness, global challenges, demographic change) and their underlying causes affect the EU as a whole rather than individual Member States. Where important differences between Member States are present, these are described in Sections 1 and 2 of the individual impact assessments.
(e) Is the problem widespread across the EU or limited to a few Member States?
The problem of coordinating R&I efforts in the thematic areas covered by the candidate partnerships affects all Member States, albeit to different degrees. However, from a general EU perspective, available evidence shows that the EU as a whole needs to step up efforts and investments in thematic areas that are crucial to tackle present and future policy challenges on several fronts, e.g. ageing population, global technological trends, and climate change to name a few. The way these problems affect the EU and its Member States is described in the horizontal part of the impact assessment and in Sections 1 and 2 of the individual impact assessments.
(f) Are Member States overstretched in achieving the objectives of the planned measure?
As indicated in the horizontal part of the impact assessment and in Sections 1 and 2 of the individual assessments, the sheer scale, speed and scope of the needed support to R&I would overstretched national resources, without guaranteeing the achievement of the intended objectives. Acting at EU-level would achieve greater impact in a more effective and efficient manner.
(g) How do the views/preferred courses of action of national, regional and local authorities differ across the EU?
No specific differences between the views of national, regional and local authorities emerged from the stakeholder consultation.
2.4 Based on the answer to the questions below, can the objectives of the proposed action be better achieved at Union level by reason of scale or effects of that action (EU added value)?
EU funded R&I activities, including those covered by the present proposal, produce demonstrable benefits compared to the corresponding national and regional initiatives, due to the scale, speed and scope achievable by acting at the EU level. In addition, the proposed initiatives should be seen as complementary and reinforcing national and sub-national initiatives in the same area.
(a) Are there clear benefits from EU level action?
Quantitative and qualitative evidence of the benefits of EU level action are available in the

interim evaluation of Horizon 2020 and in the impact assessment of Horizon Europe, among others. An analysis of the emerging challenges in each thematic areas, of the EU's competitive positioning, as well as feedback gathered from different types of stakeholders for the present impact assessment indicate that EU level action remains appropriate also for the present proposal. In addition, the benefits of acting at EU-level have been illustrated by the success and the impact achieved by the predecessors to the proposed initiative.

(b) Are there economies of scale? Can the objectives be met more efficiently at EU level (larger benefits per unit cost)? Will the functioning of the internal market be improved?

EU funded R&I activities, including those covered by the present proposal, produce demonstrable benefits compared to the corresponding national and regional initiatives, due to the scale, speed and scope achievable by acting at the EU level. This is the case both in terms of effectiveness in achieving intended policy objectives, but also in terms of efficiency. Positive impact is also visible in terms of competitiveness: recent data on EU funded R&I activities indicate that EU-funded teams grow 11.8% faster and are around 40% more likely to be granted patents or produce patents applications than non-EU funded teams. Efficiency gains are also visible in terms of dissemination of results to users beyond national borders, including SMEs and citizens. EU funded R&I is more effective in leveraging private investment. Finally, there are clear additionality benefits (i.e. EU R&I funding does not displace or replace national funding), as the EU focuses on projects that are unlikely to be funded at national or regional level. Overall, this is beneficial to the functioning of the internal market in several respects, including human capital reinforcement through mobility and training, the removal of barriers to cross-border activity for economic players including SMEs, easier access to finance and to relevant knowledge and research, and increased competition in the area of R&I.

(c) What are the benefits in replacing different national policies and rules with a more homogenous policy approach?

A homogeneous policy approach in the various thematic areas covered by the present proposal would reduce fragmentation and increase efficiency and effectiveness in meeting the intended policy objectives. Indeed fragmentation, persisting barriers in the internal market and differences in the resources available to Member States are some of the key problems that stand in the way of fully achieving the intended policy objectives and reaching the required critical mass to obtain tangible results. Specific detail on how these issues differ in each thematic area are illustrated in Sections 1 and 2 of the individual impact assessments, so as to reflect the specificities of each case.

(d) Do the benefits of EU-level action outweigh the loss of competence of the Member States and the local and regional authorities (beyond the costs and benefits of acting at national, regional and local levels)?

The proposed initiative does not lead to a loss of competence of the Member States. In fact, the proposed initiative should be seen as complementary and reinforcing national and sub-

national initiatives in the same area. Previous quantitative and qualitative assessments of Horizon Europe and Horizon 2020 have shown that the proposed EU-level action do not displace national ones and tend to concentrate on initiatives that would not have been funded by the Member States themselves, or would not have reached the same scale and ambition without EU-level intervention, due to their complexity and trans-national nature.

(e) Will there be improved legal clarity for those having to implement the legislation?

Yes. The proposed initiatives will be implemented in line with the Horizon Europe single set of rules for participation; this will ensure increased clarity and legal certainty for end beneficiaries, other stakeholders and programme administrators. It will also reduce the administrative burden for beneficiaries, and for the Commission services. In addition, the accessibility and attractiveness of the broader Horizon Europe programme, in particular for applicants with limited resources, would be sustained.

3. Proportionality: How the EU should act

3.1 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the proportionality of the proposal and a statement allowing appraisal of the compliance of the proposal with the principle of proportionality?

The principle of proportionality underpins the entire analysis of the candidate partnerships. Specifically, the analysis included in the accompanying impact assessment is structured along the following logic: 1. Justification of the use of a partnership approach in a given area (including considerations on additionality, directionality, link with strategic priorities) instead of other forms of intervention available under Horizon Europe; 2. If the partnership approach is deemed appropriate, proportionality considerations guide the assessment of which type of partnership intervention (collaborative calls, co-programmed, co-funded or institutionalised partnership) is most effective in achieving the objectives. This will also be reflected in the explanatory memorandum.

3.2 Based on the answers to the questions below and information available from any impact assessment, the explanatory memorandum or other sources, is the proposed action an appropriate way to achieve the intended objectives?

The proposed initiative only focuses on areas where there is a demonstrable advantage in acting at the EU-level due to the scale, speed and scope of the efforts needed for the EU to meet its long-term Treaty objectives and deliver on its strategic policy priorities and commitments. In addition, the present proposal leaves full freedom to the Member States to pursue their own actions in the policy areas concerned. This will also be reflected in the explanatory memorandum.

(a) Is the initiative limited to those aspects that Member States cannot achieve

satisfactorily on their own, and where the Union can do better?
The proposed initiative only focuses on areas where there is a demonstrable advantage in acting at the EU-level due to the scale, speed and scope of the efforts needed for the EU to meet its long-term Treaty objectives and deliver on its strategic policy priorities and commitments.
(b) Is the form of Union action (choice of instrument) justified, as simple as possible, and coherent with the satisfactory achievement of, and ensuring compliance with the objectives pursued (e.g. choice between regulation, (framework) directive, recommendation, or alternative regulatory methods such as co-legislation, etc.)?
For each of the candidate partnerships, the analysis carried out in the accompanying impact assessment has explored several options for implementation. A comparative assessment of the merits of each option also included an analysis of the simplicity of the intervention, its proportionality and effectiveness in achieving the intended objectives. This is reflected in the fact that a tailored approach has been suggested for each candidate partnership, ranging from looser forms of cooperation to more institutionalised ones, depending on the intended policy objectives, specific challenges, and desired outcome identified in each case.
(c) Does the Union action leave as much scope for national decision as possible while achieving satisfactorily the objectives set? (e.g. is it possible to limit the European action to minimum standards or use a less stringent policy instrument or approach?)
The proposed approach leaves full freedom to the Member States to pursue their own actions in the policy areas covered by the present proposal.
(d) Does the initiative create financial or administrative cost for the Union, national governments, regional or local authorities, economic operators or citizens? Are these costs commensurate with the objective to be achieved?
The proposed initiatives do create financial and administrative costs for the Union, national governments and, depending on the chosen mode of implementation, for regional and local authorities. In addition, economic operators and other stakeholders potentially involved in the candidate partnerships will also incur some costs linked to implementation. The financial cost of the proposed initiative is covered under the Horizon Europe programme. Its exact amount is still subject to political decision. As regards the candidate partnerships and the different modes of implementation (co-programmed, co-funded, institutionalised), the relevant costs and benefits are assessed in the individual impact assessments covering each candidate partnership. The additional administrative costs of implementation via partnerships are limited, when compared to the administrative costs of implementation through traditional calls. As indicated by comparable experience with previous initiatives and in feedback provided by a variety of stakeholders, these costs are expected to be fully justified by the benefits expected from the proposed initiative. Where available, additional details on costs are provided in Annex 3 of the impact assessment.

(e) While respecting the Union law, have special circumstances applying in individual Member States been taken into account?

Where relevant, differences between Member States in capacity and stage of advancement of R&I in specific thematic areas have been taken into account in the individual impact assessments.

1. BACKGROUND INFORMATION FOR ALL INITIATIVES

1.1. Selection criteria of European Partnerships

Partnerships based on Article 185 and 187 TFEU *shall be implemented only where other parts of the Horizon Europe programme, including other forms of European Partnerships would not achieve the objectives or would not generate the necessary expected impacts, and if justified by a long-term perspective and high degree of integration.* At the core of this impact assessment is therefore the need to demonstrate that the impacts generated through a Partnership approach go beyond what could be achieved with traditional calls under the Framework Programme – the Baseline Option. Secondly, it needs to assess if using the Institutionalised form of a Partnership is justified for addressing the priority.

The necessity test for a European Partnership (as set out in the Horizon Europe regulation) has two levels:

1. **The justification for implementing a priority with a European Partnership** to address Horizon Europe and EU priorities. This is linked to demonstrating that a European Partnership can produce added value beyond what can be achieved through other Framework Programme modalities, notably traditional calls in the work programmes (Option 0 – Baseline).
2. **The justification for the use of the form of Institutionalised Partnership:** Once it has been demonstrated that a partnerships approach is justified, co-programmed and/or co-funded forms are considered for addressing the priorities as they are administratively lighter, more agile and easier to set-up (Options 1 and/or 2). As Institutionalised Partnerships require setting up a legal framework and the creation of a dedicated implementation structure, they have to justify higher set-up efforts by demonstrating that it will deliver the expected impacts in a more effective and efficient way, and that a long-term perspective and high degree of integration is required (Option 3).

The outcomes of the ‘necessity test’ is presented together with the preferred option.

Figure 6 Horizon Europe selection criteria for the European Partnerships

Common selection criteria & principles	Specifications
1. More effective (Union added value) clear impacts for the EU and its citizens	Delivering on global challenges and research and innovation objectives
	Securing EU competitiveness
	Securing sustainability
	Contributing to the strengthening of the European Research and Innovation Area
	Where relevant, contributing to international commitments
2. Coherence and	Within the EU research and innovation landscape

Common selection criteria & principles	Specifications
synergies	Coordination and complementarity with Union, local, regional, national and, where relevant, international initiatives or other partnerships and missions
3. Transparency and openness	<p>Identification of priorities and objectives in terms of expected results and impacts</p> <p>Involvement of partners and stakeholders from across the entire value chain, from different sectors, backgrounds and disciplines, including international ones when relevant and not interfering with European competitiveness</p> <p>Clear modalities for promoting participation of smes and for disseminating and exploiting results, notably by smes, including through intermediary organisations</p>
4. Additionality and directionality	<p>Common strategic vision of the purpose of the European Partnership</p> <p>Approaches to ensure flexibility of implementation and to adjust to changing policy, societal and/or market needs, or scientific advances, to increase policy coherence between regional, national and EU level</p> <p>Demonstration of expected qualitative and significant quantitative leverage effects, including a method for the measurement of key performance indicators</p> <p>Exit-strategy and measures for phasing-out from the Programme</p>
5. Long-term commitment of all the involved parties	<p>A minimum share of public and/or private investments</p> <p>In the case of institutionalised European Partnerships, established in accordance with article 185 or 187 TFEU, the financial and/or in-kind, contributions from partners other than the Union, will at least be equal to 50% and may reach up to 75% of the aggregated European Partnership budgetary commitments</p>

1.2. Overview of potential functions for a common back office among Joint Undertakings

Functions	Current situation	Option of joint back-office	Comments
Organising calls for grant and proposal evaluations	Each JU organises this independently.	<p>A central organisation of evaluation, logistics, contracting evaluators, managing the data of the evaluation results</p> <p>Central database of potential evaluators with domain expertise in thematic areas of partnerships</p>	The evaluations would still need to be supervised by the Scientific staff of the individual Joint Undertakings (consensus meetings of expert evaluators etc)
Human Resources related matters	<p>Each JU has own HR policy and resources</p> <p>Quite some resources spent on recruitment in some JUs</p> <p>Some HR facilities are procured from external contractors</p> <p>Some JUs have a Service Level</p>	<p>More generic resources and expertise for HR matters</p> <p>More consistency in HR policy</p> <p>Shared HR investment for specialised expertise</p>	Ensuring consistency with EC HR policies is already in place

	Agreement with COM for HR	(IP and legal)	
Financial management	<p>Each JU conducts own financial contract management; differences between JUs</p> <p>Each JU is audited separately.</p> <p>Auditing at project level more frequent than in other Horizon 2020 parts and outsourced by JUs thus differences</p> <p>ECA: too many audits on JUs</p>	<p>Financial management by one core team of financial staff</p> <p>Would reduce the number of interfaces for audits and simplifies the auditing of the all JUs</p> <p>Harmonisation of project auditing</p>	<p>Simplifies the harmonisation of financial management across JUs in line with Horizon Europe</p>
Communication (internal and external)	<p>Each JU has a separate communication strategies, teams and resources</p>	<p>A common back-office can support activities such as event organisation, dissemination of results, setting up website communication</p> <p>Can help create a more visible Partnership brand</p>	<p>A considerable share of communication activity is partnership specific (addressing particular target groups, synthesising project results) however there are generic communication activities that can be shared</p> <p>Needs to avoid duplication of efforts</p>
Data management on calls, project portfolios, information on project results	<p>Most JUs but not all use e-Corda for project data</p> <p>Overall IT integration of JUs still difficult</p>	<p>Harmonised data management</p> <p>Reduction of IT systems and support that is procured</p>	<p>This will need to happen regardless of the common back office but will likely be more smooth if managed centrally</p>

2. BACKGROUND INFORMATION FOR THIS SPECIFIC INITIATIVE

Table 1: EU28 share of the world production of electronics for downstream industries and mass-market consumer devices — shares in 2018

Sector	Semiconductors	Electronic boards	Electronic equipment (embedded and stand-alone)	Downstream industries (auto, aerospace, etc)	Services related to end user equipment
Automotive	22%	22%	27%	20%	22%
Industrial equipment	14%	17%	20%	18%	13%
Aerospace, defence & security	15%	15%	22%	22%	19%
Health and care	20%	20%	19%		20%
Home appliances	4%	8%	17%		
Audio & video	5%	7%	11%		
Computers & data processing	4%	5%	5%		5%
Telecommunications	5%	4%	4%		18%

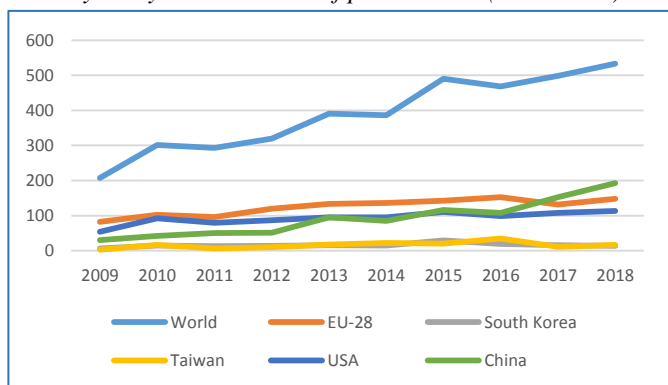
Source: European Commission. (2019). Study on Emerging technologies in electronic components and systems (ECS) - Opportunities ahead. SMART 2018-0005.

The darker area presents segments where Europe has a strong position with the highest spillover to downstream industries.

Europe risks to be a follower in emerging key digital technologies

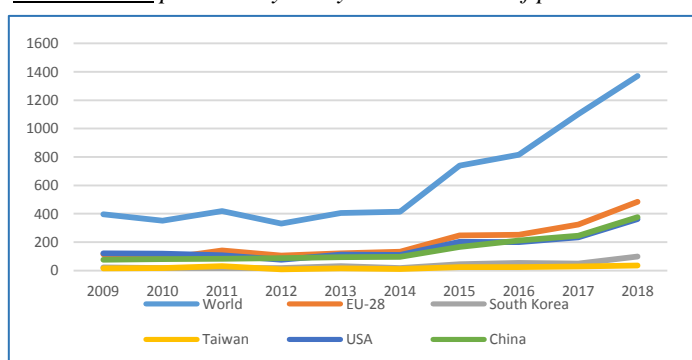
Scientific publications produced per region

Figure 1: Production of publications on microelectronics per country and year — number of publications (2009-2018)



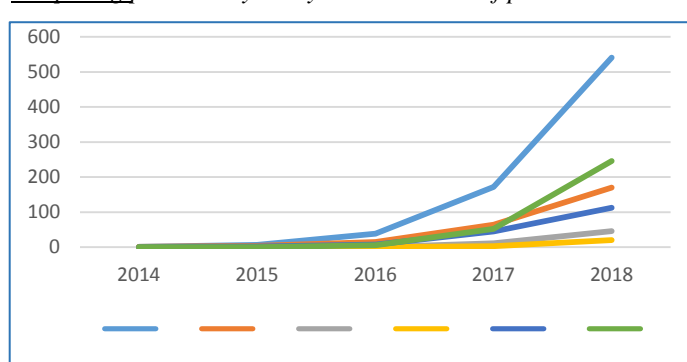
Source: Calculations by Technopolis Group based on Scopus

Figure 3: Growth in production of publications on computer architectures per country and year — number of publications



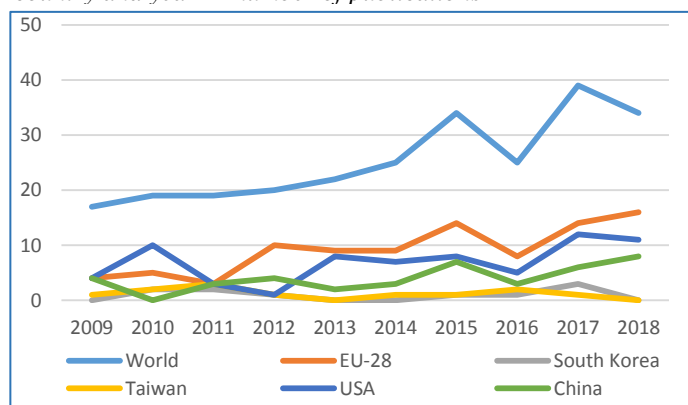
Source: Calculations by Technopolis Group based on Scopus data

Figure 2: Growth in production of publications on edge computing per country and year — number of publications



Source: Calculations by Technopolis Group based on Scopus data

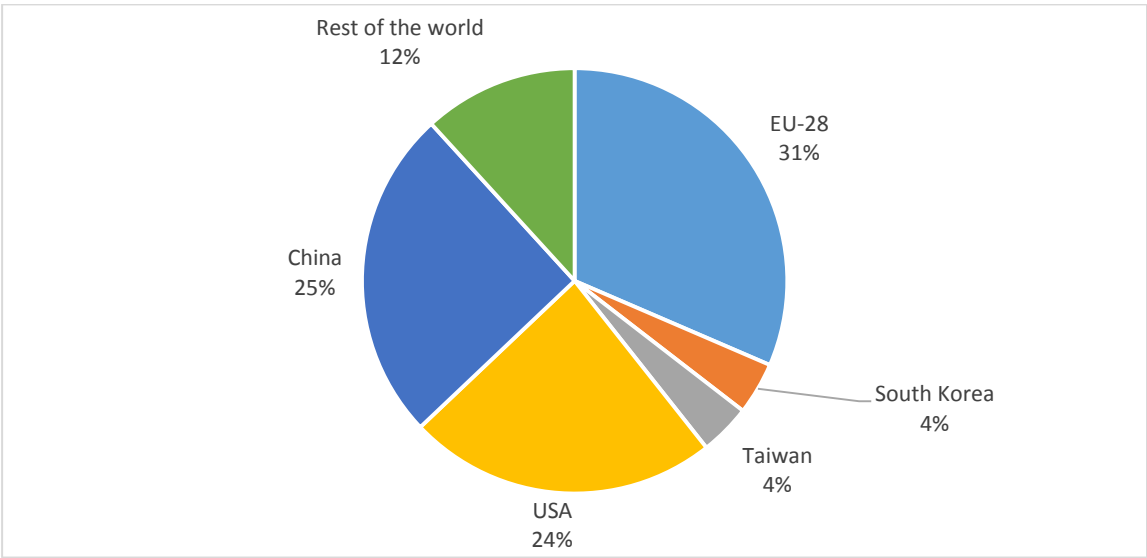
Figure 4: Growth in production of publications on AI per country and year — number of publications



Source: Calculations by Technopolis Group based on Scopus data

The analysis of scientific publications indicate that Europe retains a strong position in microelectronics research³³, producing 31% of publications in the period 2009-2018 (Figure 5). China (25%) comes second followed by the US (24%).

Figure 5: Publications in the area of microelectronics by country (2009-2018)



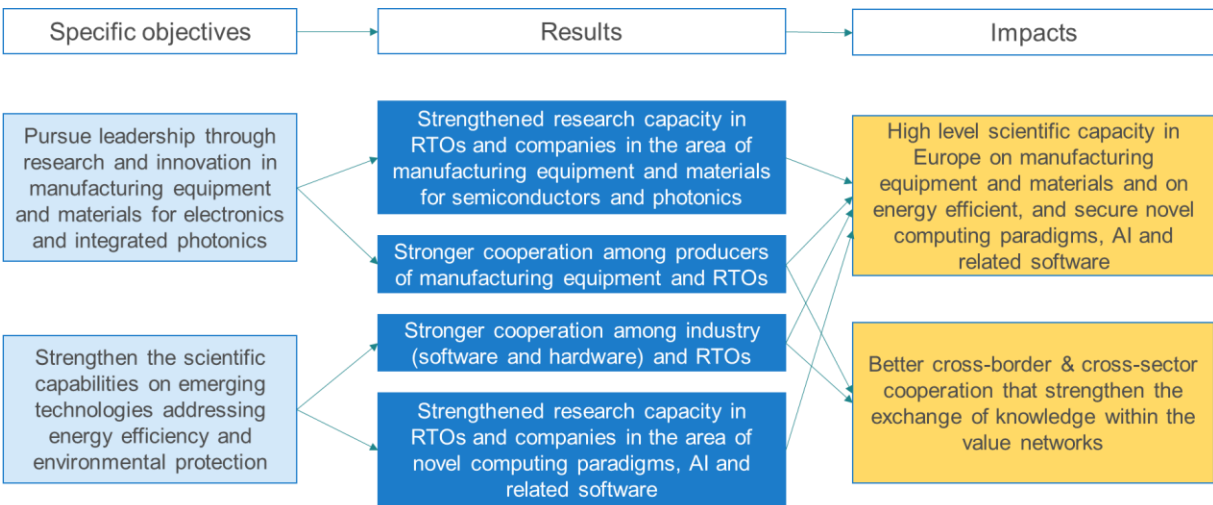
Source: Calculations by Technopolis Group based on Scopus data.

However, looking at the performance of MS, and comparing their performance against other countries, China is the leader followed by the US (Figure 2). The two top European countries, Germany and France, remain far behind. Comparing the two figures and observing the significant differences in the capacity of individual countries, illustrates the limitations of thinking national, while it also sketches out possibilities and the **added value of pooling together resources at the European level**.

Targeted impacts for the initiative

The initiative is estimated to lead to two key scientific impacts, as illustrated below:

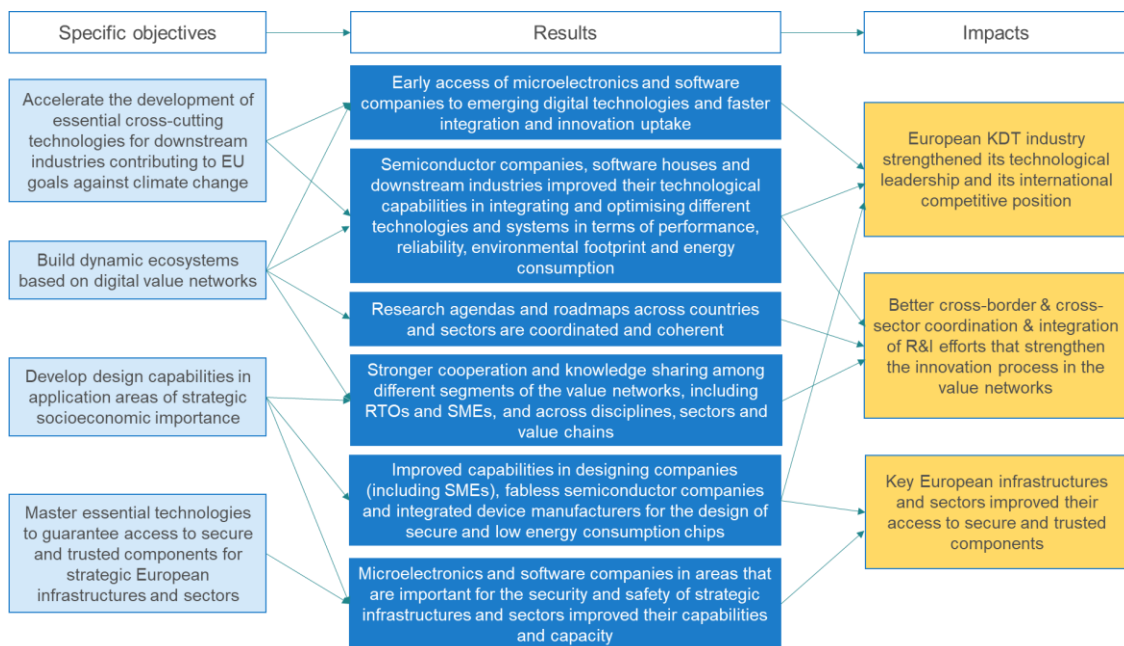
Figure 6: Impact pathway leading to scientific impacts



³³ The area of microelectronics was defined by a cloud of keywords suggested by the Expert Panel. The other technological areas included in the analysis were defined in a similar way.

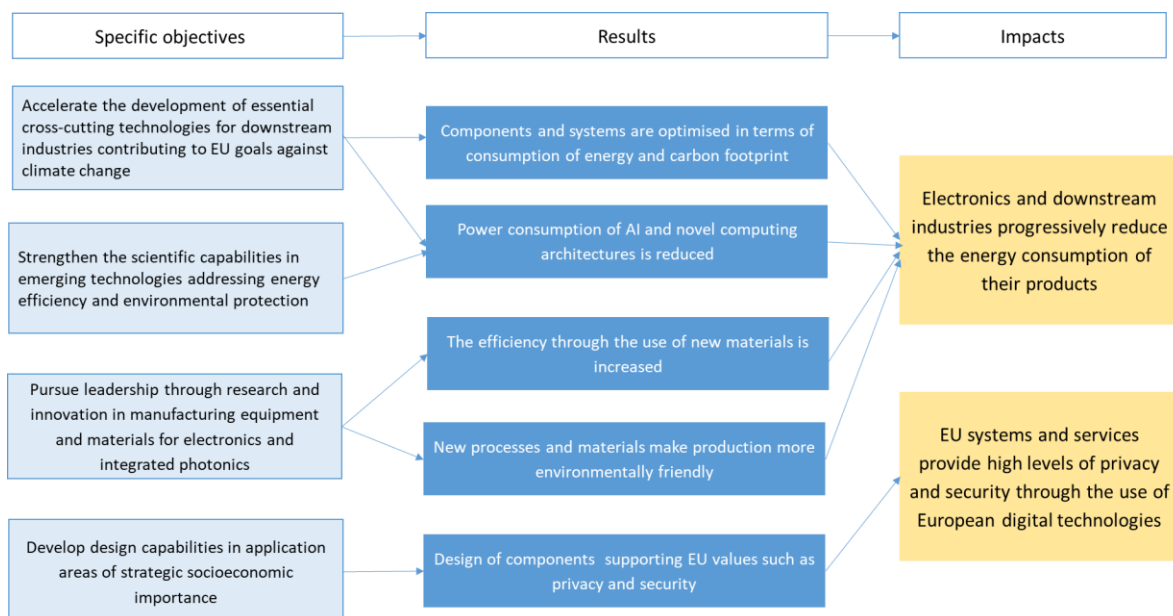
The expected key economic/technological impacts of the initiative are mapped in Figure 7.

Figure 7: Impact pathway leading to economic/technological impacts



The scientific and economic/technological impacts will also support the attainment of societal impacts as shown in Figure 8.

Figure 8: Impact pathway leading to societal impacts



OPTIONS DISCARDED AT AN EARLY STAGE

Option 2 – Co-funded European Partnership

The Co-funded Partnership is based on a *Grant Agreement* between the Commission and the consortium of partners, resulting from a call for a proposal for a programme co-funded action implementing the European Partnerships in the Horizon Europe Work Programme.

Key characteristics of Option 2 – Co-funded European Partnership

	Implications of option
Enabling appropriate profile of participation (<i>actors involved</i>)	<ul style="list-style-type: none"> Partners can include <i>any</i> <i>national funding body or governmental research organisation</i>, Possible to include also <i>other type of actors</i>, including foundations. It is not possible to have the KDT industry associations as partners. Requires substantial national R&I programmes (competitive or institutional) in the field and therefore limited the participation to few Member States with existing national KDT programmes. Usually only legal entities from countries that are part of the consortia can apply to calls launched by the partnership, under national rules.
Supporting implementation of R&I agenda (<i>activities</i>)	<ul style="list-style-type: none"> Activities may range from R&I, pilot, deployment actions to training and mobility, dissemination and exploitation, but according to national programmes and rules. The decision and implementation are responsibility of the partners through institutional funding KDT programmes, or by “third parties” receiving financial support, following calls for proposals launched by the consortium. The scale and scope of the initiative is limited and depends on the participating programmes. The resulting funded R&I actions are typically smaller in scale than FP projects.
Ensuring alignment with R&I agenda (<i>directionality</i>)	<ul style="list-style-type: none"> The strategic R&I agenda/roadmap is agreed between the Member States and EC without the participation of industry. The annual work programme drafted by partners, approved by EC. Objectives and commitments are set in the Grant Agreement. The coherence of the partnership with other actions of the can be ensured by partners and EC. There are strong synergies with national/regional programmes and activities, and they can be ensured by the Member States. Synergies with other European programmes or industrial strategies are limited.
Securing leveraging effects (<i>additionality</i>)	<ul style="list-style-type: none"> Low possibilities for leverage of industry contribution as industry does not participate in the decision making.

Option 3a – Institutionalised European Partnership under Art 185 TFEU

Article 185 of the TFEU is a complex and high-effort arrangement and is based on a Decision by the European Parliament and Council and implemented by dedicated structures created for that purpose. It allows the Union to participate in programmes jointly undertaken by Member States and Associated Countries.

Table 3: Key characteristics of Option 3: Institutionalised Partnership Art 185 TFEU

	Implications of option
Enabling appropriate profile of participation (<i>actors involved</i>)	<ul style="list-style-type: none"> Partners can include <i>Member States and Associated Countries</i>. Non-associated third countries can only be included as partners if foreseen in the basic act and subjected to conclusion of dedicated international agreements. Good geographical coverage is required with participation of at least 40% of Member States The existence of substantial national R&I programmes (competitive or institutional) in the field is required Substantial differences can be found between legal entities from Participating States and those from other Member or Associated States in the rules for participation and funding.
Supporting implementation of R&I agenda (<i>activities</i>)	<ul style="list-style-type: none"> Horizon Europe's standard actions that allow a broad range of coordinated activities from R&I to uptake apply. In case of implementation based on national rules (subject to derogation) the activities follow the national programmes and rules. The option allows the integration of national funding and Union funding into the joint funding of projects
Ensuring alignment with R&I agenda (<i>directionality</i>)	<ul style="list-style-type: none"> The strategic R&I agenda/roadmap is agreed between partners and the EC The objectives and commitments are set in the legal base. The annual work programme is drafted by partners and approved by the EC The commitments include the obligation for financial contributions (e.g. to administrative costs, from national R&I programmes).
Securing leveraging effects (<i>additionality</i>)	<ul style="list-style-type: none"> National R&I activities can be integrated into the programme, which can then be matched from the EU budget to increase scope and promote transnational cooperation.