



Mid-term review of the contractual Public Private Partnerships (cPPPs) under Horizon 2020

Report of the Independent Expert Group



Research and
Innovation

**Mid-term review of the contractual Public Private Partnerships (cPPPs)
under Horizon 2020 — Report of the Independent Expert Group**

European Commission
Directorate-General for Research and Innovation
Directorate D — Industrial Technologies
Unit D.2 — Advanced Manufacturing Systems and Biotechnologies

Contact Gustaf Winroth
E-mail Gustaf.Winroth@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu

European Commission
B-1049 Brussels

Manuscript completed in September 2017.

This document has been prepared for the European Commission however it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

More information on the European Union is available on the internet (<http://europa.eu>).

Luxembourg: Publications Office of the European Union, 2017

Print	ISBN 978-92-79-71876-2	doi:10.2777/455356	KI-02-17-950-EN-C
PDF	ISBN 978-92-79-71875-5	doi:10.2777/699241	KI-02-17-950-EN-N

© European Union, 2017

Reuse is authorised provided the source is acknowledged. The reuse policy of European Commission documents is regulated by Decision 2011/833/EU (OJ L 330, 14.12.2011, p. 39).

For any use or reproduction of photos or other material that is not under the EU copyright, permission must be sought directly from the copyright holders.

Cover images: © Lonely, # 46246900, 2011. © ag visuell #16440826, 2011. © Sean Gladwell #6018533, 2011. © LwRedStorm, #3348265, 2011. © kras99, #43746830, 2012. Source: Fotolia.com

Mid-term review of the contractual Public Private Partnerships (cPPPs) under Horizon 2020

Report of the Independent Expert Group

Mid-term review of the contractual Public-Private Partnerships (cPPPs) running under Horizon 2020

Table of Contents

EXECUTIVE SUMMARY	3
1. INTRODUCTION	6
1.1. Purpose of cPPPs	6
1.2. Implementation of cPPPs	6
2. METHODOLOGY	9
2.1. Scope of the evaluation	9
2.2. Criteria of the evaluation	9
2.3. Working procedure within the Group	10
3. CPPPS ASSESSMENT: FINDINGS AND OVERALL CONSIDERATIONS DRIVEN BY THE MAIN FIVE CRITERIA	11
3.1. Efficiency	11
3.2. Relevance and appropriateness	14
3.3. Coherence with other EU related Actions	17
3.4. Effectiveness	18
3.5. EU Value Added	21
4. CPPP MULTIDIMENSIONAL ANALYSIS	23
5. CONCLUSIONS	25
ANNEXES	26

EXECUTIVE SUMMARY

This Report presents the results of the Interim Evaluation of nine Contractual Public Private Partnerships (cPPPs) over the first three years of Horizon 2020, 2014-2016, as foreseen in their contractual agreements. The Group of independent Experts have operated on the basis of Terms of References provided by the European Commission and of a methodology defined at the beginning of the evaluation exercise.

To date, there are ten cPPPs covering a variety of industrial sectors and technological domains: Factories of the Future (FoF), Energy-efficient Buildings (EeB), Green Vehicles (EGVI), 5G, Sustainable Process Industry (SPIRE), Robotics, Photonics, High Performance Computing (HPC), Big Data and Cybersecurity. The cPPP on Cybersecurity is not included in this mid-term evaluation since it was launched in 2016 and no relevant activities (such as calls) were carried out in the same year.

In the period 2014-2016, 412 cPPP projects have been funded for about € 2.1 billion.

The cPPP is still too young an instrument to provide an exhaustive and differentiated evaluation. Only three of them were created in the FP7, while most of the projects of the more recent ones have still to be completed. In addition, the nine cPPPs differ considerably in their “nature”, so that they are not directly “comparable” to each other. The “oldest” ones, FoF, EeB, EGVI, are broad in covering several industrial sectors, while the “youngest” are mainly technology driven, representing the exponential-evolutionary technologies which cross all industrial sectors around Europe.

The evaluation has been performed along five main dimensions defined in the Terms of References: Efficiency, Relevance, Coherence, Effectiveness and EU Value Added. The working methodology consisted in organising the nine cPPPs into three clusters, to which a sub-group of experts was assigned to perform the interviews and produce dedicated contributions. The analysis followed the same assessment criteria and was discussed within the whole Expert Group and with European Commission representatives in plenary meetings in Brussels. The Group also had the opportunity to discuss these issues with two members of the European Parliament (MEP Cabezón Ruiz, MEP Ehler). The Group also decided to provide an overall analysis of the nine cPPPs. The “holistic” evaluation along the main dimensions of the organization and functioning of the cPPPs is only provided in terms of best practices.

The cPPP instrument was designed to implement strategies to increase the competitiveness impact of European R&D funding through Horizon 2020, offering a more active role to industry in the management of the instrument and in promoting higher technology readiness levels (TRLs) of the projects. The cPPPs have substantially achieved these targets, representing a further shift from a top-down to a bottom-up approach in defining R&I European strategies, spanning the whole innovation cycle and relevant actors.

Overall the management of cPPPs has been efficient. In terms of time to grant and success rates they have performed better than the average of Horizon 2020, although there is still room for improvement. Areas remarked in many of the interviews include more focused, challenging and dynamically updated roadmaps and more alignment between roadmaps and calls.

Inclusion and participation of SMEs are higher than on average in Horizon 2020 for most of the cPPPs. Differences with regards to sectors and types of SMEs would need additional analysis and could provide more insights about the possibility to further increase SMEs participation.

The Expert Group underlines that more clarity is needed regarding institutional status and a reformed model of governance would improve transparency and openness (also to SMEs). Improvements in the communication and dissemination of results along the lines of some observed best practices are recommended for some of the cPPPs.

With respect to effectiveness and impact, the Expert Group recommends urgently redesigning and harmonising the Key Performance Indicators (KPIs). A more robust monitoring of the KPIs would increase results and the impact in the short and medium term. They should be challenging, realistic, measurable and comparable among each other as to ensure an adequate response to technology evolution and industry needs.

The cPPPs should be integrated in a more coherent strategy of priorities and objectives with other EU instruments, avoiding duplication and overlapping and exploiting synergies with national and regional policies, including structural funds. In particular cPPPs should develop synergies with industry-oriented instruments, as JTIs and EIT KICs.

The Expert Group suggests that to increase European value added of cPPPs, and to ensure a closer link between roadmaps and regional and national policies, a deeper involvement of Member States is desirable. This is especially important in building synergies with structural funds.

Finally, the Expert Group believes that the recently proposed mission-oriented approach (in the FAB-APP-LAB Report) would empower the cPPPs, providing a proper base to improve their efficiency and effectiveness along the lines recommended by this Group.

The Recommendations

Recommendation #1: The process of translating priorities from the roadmap into calls should be more participatory, ensuring clear links between roadmaps and calls under a common process between the industrial association and the European Commission. The more focused calls in line with the needs defined in the roadmap will increase the effectiveness and the quality of proposals. An agreed, clearer timeline between the European Commission and private side is suggested, ensuring that time-sensitive priorities are fully implemented.

Recommendation #2: The governance of cPPPs should be revised. Associations and European Commission should enhance the transparency of the management processes, widen the debate and update reference roadmaps focussing on reaching the highest number of stakeholders and the broader society. Furthermore, the systematic dissemination of results, the development of studies of exploitation and the transferability of technical solutions within the same sector and along the supply chain are strongly encouraged. Participation of SMEs and EU-13 countries should be fostered.

Recommendation #3: The links between the cPPPs and the other European Commission instruments should be strengthened. The European Commission should take systemic action (e.g. mapping synergies) to develop joint programming, cross-fertilisation and partnerships.

Recommendation #4: The Expert Group strongly recommends redesigning the KPI framework of all cPPPs. The redesign process should be coordinated by the European Commission and start soon after the publication of this report.

Recommendation #5: In order to enhance the impact of the cPPPs on national and regional policies as a way to increase their EU value-added, Member States should be represented in the cPPPs. The Commission should explore jointly with Member States suitable mechanisms.

Recommendation #6: The Expert Group joins the Fab-Lab-App recommendation to move towards a mission-driven approach in the next Framework Programme. Industrial associations and the European Commission should cooperatively mobilise joint investments in order to tackle industrial, scientific and societal challenges. Mobilising joint investment in established missions, through a dynamic and flexible co-fund mechanism may be a way to take the cPPP instrument forward.

1. INTRODUCTION

1.1. Purpose of cPPPs

The contractual Public-Private Partnerships (cPPPs) originate from the European Economic Recovery Plan back in 2008 with the purpose of helping innovation in key industrial sectors. At that time, three research Public-Private Partnerships (PPPs) were initiated (i.e. Factories of the Future (FoF), Energy-efficient Buildings (EeB), and Green Cars (EGVI in Horizon 2020)). The final assessment of the research PPPs in the European Economic Recovery Plan, published in June 2013, concluded that the leverage effect for private investment was far superior in the PPPs (57%) compared to the standard seventh framework programme (FP7) (34%). The 366 projects, launched under FP7 with a total investment of 2.4 billion €, accordingly proved that they could significantly support innovation within their sectors.

These results paved the way for including the cPPPs into Horizon 2020. To date, there are ten cPPPs covering a variety of industrial sectors and technological domains: Factories of the Future (FoF), Energy-efficient Buildings (EeB), Green Vehicles Initiative (EGVI), 5G, Sustainable Process Industry (SPIRE), Robotics, Photonics, High Performance Computing (HPC), Big Data, and Cybersecurity.

As already presented in previous evaluations, the cPPP instrument is designed to implement strategies to increase the competitiveness impact of European R&D funding through Horizon 2020: it offers a more active role to industry in defining roadmaps¹, in significantly contributing to work programmes and calls and in promoting also higher technology readiness levels (TRLs) for new technologies funded under the projects concerned.

1.2. Implementation of cPPPs

In Horizon 2020, this type of PPP is implemented as *contractual* PPPs to facilitate and speed up their setting-up in comparison to FP7. Currently the cPPPs are implemented in different parts of Horizon 2020, particularly under the Industrial Leadership Pillar (the parts on Nanotechnologies, Advanced Materials, Biotechnology, and Advanced Manufacturing and Processing – NMBP, and Information and Communication Technologies – ICT), but also under the Excellence Science Pillar (parts on Future and Emerging Technologies and Research Infrastructures) and the Societal Challenges Pillar (e.g. on Energy and Security). As a consequence, Horizon 2020 rules apply entirely to these activities. Table 1 shows the total EU funding allocated to each cPPP and the number of projects funded up to 2016.

¹ In this context "roadmaps" also encompass the Strategic Research and Innovation Agendas (SRIAs) that are the main source of strategic considerations laid out in some of the cPPPs.

Table 1. Total EU funding (€) allocated to each cPPP and number of projects for the period 2014-2016.

	Total Union (€)	European funding	Number of projects
5G	129 849 414		19
Big Data	69 879 676		15
EeB	203 759 304		46
EGVI	281 659 651		36
FoF	428 061 070		94
HPC	179 166 049		33
Photonics	228 402 782		56
Robotics	235 991 838		52
SPIRE	356 873 815		61

European Technology Platforms (ETPs) were in existence prior to the establishment of the cPPPs, and allowed for a transparent and open forum for industry to put forward their research and technology priorities. The ETPs were also instrumental in creation the research and innovation associations that nowadays represent the private side of the cPPPs.

In order to better align Horizon 2020 funding with industry needs, industry has an important role in devising the programmes' research priorities. The associations produce and update multi-annual roadmaps specifying research priorities, some of which are subsequently adopted in the work programme.

As mentioned in the previous section, the implementation of the cPPPs under FP7 was also assessed by an independent Expert Group in 2013². The recommendations of this former Group are set out in Annex 1; they have been the basis for introducing cPPPs into the Horizon 2020 framework. The implementation of these recommendations and their suitability for this mid-term review, is summarised section 3 of this report. Most recommendations, but not all, have been taken on board.

1.1 Life cycle and nature of the cPPPs

The Expert Group assessed the evolution of cPPPs, their processes and their performance by means of a life cycle orientation.

Three research cPPPs had already been established under FP7 and were continued under Horizon 2020. An additional research cPPP and six new technology-focussed cPPPs were established after 2014. The approach to

² Final Assessment of the Research PPPs in the Recovery Plan: Factories of the Future, Energy-efficient Buildings and European Green Cars, KI-02-13-270-EN-C, 2013

assessing these cPPPs should therefore depend on their maturity. Hence, a “one size fits all” methodology should be avoided as the cPPPs have been set-up in different years and their timeline is not linear. The generic model followed by the Expert Group builds on three phases in the life cycle, namely “*Inception*” (where we could consider Big Data), “*Ramp-up*” (5G, HPC, Photonics, Robotics and SPIRE) and “*Steady-state*” (FoF, EeB and EGVI). Subsequently, their evolution could follow a “*Continuation*”, “*Renewal*”, “*Merging*” or the “*Sunset State*” phase. Depending on the impact of any particular cPPP, a decision would be taken to upgrade, continue, merge with another cPPP or terminate the work of a cPPP. The Group recalls that this assessment represents a mid-term review of the nine cPPPs and not a final evaluation. This allows for recommendations to be implemented in the currently running cPPPs.

In addition to the above life cycle approach, another crucial aspect should be mentioned. The cPPPs differ considerably as to their “*nature*”, which means that they are not directly “*comparable*” one to one. The first cPPPs, FoF, EeB, EGVI, are broad in covering several industrial sectors. This approach was followed by SPIRE, Robotics and Photonics, which by their nature are enabling the future smartness and competitiveness of European Industries. While SPIRE follows the sector-driven shape the other two are technology-driven. The sector-driven cPPPs can be approached as horizontal programmes of the Horizon 2020 research programme, driven by industry. Newly born but still mature as to their technological (ETP) origins, Photonics, Robotics, 5G, HPC and Big Data constitute the group of technology-driven cPPPs, representing the exponential-evolutionary technologies which cross all industrial sectors around Europe. This feature of cPPPs represents a key aspect which induces major differences in the establishment of a suitable smart, dynamic set of KPIs based on which the current assessment can be realistically performed and reported.

2. METHODOLOGY

2.1. Scope of the evaluation

The legal basis for establishing a cPPP is laid out in Article 25 of the Regulation establishing act of Horizon 2020 (1291/2013/EU). Horizon 2020 activities are implemented through the work programmes.

The contractual arrangement forming the basis for each cPPP is signed by representatives of the European Commission and the relevant industrial association. It specifies the partnership's objectives, commitments, Key Performance Indicators (KPIs) and expected outputs.

The contractual arrangements of the cPPPs foresee a mid-term review performed by independent experts. The Terms of Reference (ToR) (Annex 2) of this review state that the Expert Group must analyse the performance of the partnerships of nine cPPPs running under Horizon 2020 and the progress towards their objectives. The review should be in line with point 9 ("Duration and review") of the respective contractual arrangement, and the report should contain recommendations and conclusions that will be used as inputs for improving the current initiatives, as well as for potential future initiatives.

This mid-term review covers the implementation of the initiatives over the first three years of nine cPPPs, between 2014-2016. The cPPP on Cybersecurity is not included in this mid-term review since it was launched in 2016 and no relevant activities (such as calls) were carried out in 2016.

This report concentrates on the cPPP instrument itself, and its particular features.

2.2. Criteria of the evaluation

This report, according to the ToR, presents the findings of the mid-term review of the nine cPPPs prepared by an Expert Group appointed by the European Commission, and chaired by Dr Paolo Annunziato.

The Expert Group's main purpose was to perform the mid-term review of the current cPPPs according to the following five criteria, as stated in the ToR:

- Assess the efficiency (including aspects such as *implementation and supervision*) and review whether the specific objectives and specific commitments set up in the correspondent contractual arrangement of each cPPP will be met by the end of Horizon 2020;
- Assess the continued relevance and appropriateness of the cPPPs in line with the individual contractual arrangements and the yearly monitoring reports;
- Assess the coherence with other initiatives and actions which are thematically related to the cPPPs;
- Assess the effectiveness of each individual cPPP and their contribution to the general policy objectives of the European Union, in particular the Horizon 2020 objectives;

- Assess the impact of the cPPPs in terms of the value added:
 - In particular at *European level*,
 - but also at regional, national and international levels,
 - The added-value of all the cPPPs together should also be assessed;
- Provide recommendations for the future of the cPPPs and any future potential research programming initiatives.

2.3. Working procedure within the Group

The Expert Group decided to structure the evaluation exercise around questions related to the five criteria stated in the ToR.

The nine cPPPs that are the subject of the evaluation were divided into three clusters, of three cPPPs each, to which a sub-group of Experts was assigned to perform the interviews and produce dedicated contributions specific to each cPPP. All reports followed the main assessment criteria defined in section 2.2 and were discussed within the entire Expert Group and with European Commission representatives in plenary meetings in Brussels.

Overall six meetings have been organised in Brussels. The chairman and the rapporteur guided the Expert Group towards summarising the evaluation produced for each cPPP, identifying common elements, as well as the idiosyncratic ones in order to prepare this final report common for all nine cPPPs.

The Expert Group was provided by the European Commission with the documents listed in Annex 3 as well as quantitative, statistical data from the CORDA database. The data was related foremost to the participation in calls, participation by funding, success rates and time to grant and referred to the 2014 – 2016 calls unless specified otherwise. These documents included all the progress monitoring reports produced, as well as responses to questions raised by the European Commission (see Annex 4) to the associations.

In addition, the Expert Group conducted interviews with Stakeholders from the cPPPs (12 June 2017) and with the European Commission officials (18 May, 6 June, 14 July 2017) as listed in Annex 5 as well as with the following Members of the European Parliament: Soledad Cabezón Ruiz and Christian Ehler (5 September 2017)³.

³ In the analysis of some cPPPs additional sources of data have been consulted, such as interviews with private and public stakeholders

3. CPPPS ASSESSMENT: FINDINGS AND OVERALL CONSIDERATIONS DRIVEN BY THE MAIN FIVE CRITERIA

The assessment of each specific criterion is presented in the following paragraphs. It consists of the main findings and overall considerations following the ToR and concludes with the corresponding recommendation. All recommendations are also provided in a summary chapter at the end of the report.

3.1. Efficiency

The first assessment criterion, the efficiency of cPPPs, focused on the implementation and supervision of the partnership under Horizon 2020, and whether the specific objectives and commitments as set-up in the contractual agreement will be met, by following the statements in the ToR (Annex 1).

Under this assessment criterion the group looked at: the relationship between ETPs and industry associations; roadmaps; cost efficiency; time to grant⁴ and success rates; representativeness.

ETPs and their strategic considerations are often linked to the associations representing the private side of the cPPP. In some cases, there is no clear-cut distinction between a private association and the platform, while in other cPPPs the associations are clearly separated from the technology platforms.

There is no unified/standard way to establish medium and long-term priorities for certain technologies and/or sectors. The roadmaps produced by the respective associations are the guiding documents for each cPPP and bring input to the priorities and calls set out in the Horizon 2020 work programmes. In these roadmaps, the technical and non-technical priorities are set out. However, it is not completely clear how these priorities are translated and effectively implemented into the content of the Horizon 2020 work programmes.

Nevertheless, the implementation of cPPPs and their management do not represent additional public financial burden as this is supported by the private side. The cPPPs have benefited from the overall simplification approach of Horizon 2020. The fact that cPPPs are sharing common Horizon 2020 rules represents a driver towards implementation and cost efficiency for all stakeholders. Nevertheless, there is room for improvement in the efficiency of the implementation in terms of coordination of the associations and the various European Commission services when several of them are involved in the implementation of the calls, such as increased level of communication and clarity of process.

⁴ The "Time to grant" depends on the process managed by the European Commission

Table 3 – Time to grant and quality/success rates: proposals above threshold and selected for funding (2014-2016 calls)

	Average time to grant (days)	Average quality rate (%) - proposals above threshold/eligible proposals	Average success rate (%) - funded projects/eligible proposals for funding
FP7	313	45.3%	16.8%
Horizon 2020	233	45.0%	11.0%
5G	203	52.5%	23.8%
Big Data	200	50.0%	17.0%
EeB	198	22.6%	12.1%
EGVI	219	41.4%	19.9%
FoF	205	25.0%	12.4%
HPC	219	66.7%	29.7%
Photonics⁵	218	59.7%	19.5%
Robotics	216	39.4%	10.1%
SPIRE	205	19.2%	8.6%

The average time to grant for calls managed by the European Commission or an Executive Agency, which is the time between the call closures and the date of the fully signed grant agreements, is, for all cPPPs, below the average of Horizon 2020 with an even more pronounced improvement when compared with the average in FP7 (Table 3). This efficiency indicator is important for calls targeting at higher TRLs since a shorter time to grant allows a better reaction to the rapid developments in innovation and market trends.

The average quality of proposals in cPPPs, as measured as the percentage of proposals above the threshold/eligible proposals, varies strongly. In fact, this is partly due to varying threshold values (10/15 and 12/15 points) and scope of the calls. The success rates for cPPP proposals above the threshold are generally higher than in other Horizon 2020 or FP7 calls (Table 3).

Success rates are equally important for TRL-centred projects. In one-stage calls much effort is invested in submitting a full-length proposal, often involving large consortia. The significant resources, time and personnel required could discourage the participation in the calls, especially for industrial partners. However high, these efforts are seen by many cPPP stakeholders as an investment instead of a cost: a good preparation upfront brings significant

⁵ Includes jointly-funded ICT-29-2014, only part of which relate to the Photonics cPPP.

benefits in the execution, reflecting the importance of keeping proposals quality competitive.

The increased interest in the work programmes under Horizon 2020 has already been evidenced in the interim evaluation of Horizon 2020. As it can be observed in table 3, the overall decrease in the final success rate (funded projects/eligible proposals) in Horizon 2020 is comparable to that of FP7, while the rate of good proposals over the threshold has remained the same.

The success rates vary between cPPPs, but stay in general at level sufficiently attractive to submit proposals. Observed variations are attributed to the level of specificities in the call topics and the industrial sectors involved.

In order to foster innovative solutions and inclusiveness in participation, there is a general trend in Horizon 2020 to widen the scope of the call topics. The cPPPs as instrument under Horizon 2020 follow this trend. In addition, as has been reflected in several interviews with stakeholders, the lack of detailed and specific requirements in the call topic text has been shown to increase the number of eligible proposals, reducing the success rates. To avoid discouragement of participation in future calls, the calls should be properly focused with well specified requirements in the topic text, preserving the inclusivity and the innovation-driven approach currently observed in the cPPPs.

Furthermore, the above is also related to the need to strengthen the process of building up the work programmes. This process currently consists of iterated consultations between the European Commission and the private side. The resulting topics, as has been underlined in several interviews, are in some cases difficult to interpret on the basis of the multiannual roadmaps. In order to ensure topics with a well-defined impact, industrial relevance and clarity for all stakeholders involved in the roadmap definition, we strongly recommend that there will be a clearer and aligned process to translate the roadmaps into specific call text.

The inclusion of relevant actors is reflected in Table 4. Participation of non-association members of the association is shown as a function of number of participations as well as a percentage of EU funding. This is a reasonable approach for high participation rates of non-members throughout all the cPPPs, which can be considered as an indicator of efficient implementation also in terms of openness and representativeness of the roadmap for the whole industry.

In addition, in order to ensure that the cPPP represents the entire value-chain, SMEs need to be sufficiently represented. As shown in table 4, the significant presence of SMEs suggests that the calls are relevant to them. Nevertheless, a wider involvement of SMEs, especially in the roadmap definition, could increase the structural impact on industrial value chains.

Table 4 – Participation and funding of applicants that are not members of the cPPP association and SME participation in projects⁶

	5G	Big Data ⁷	EeB	EGVI	FoF	HPC ⁸	Photonics ⁹	Robotics ¹⁰	SPIRE
% of non-members in the participations (beneficiary count)	71	78	75	67	77	62	80	58	73
% of EU funding to non-members	60	71	70	53	77	60	71	46	71
% of SMEs in participations (partner count)	>17	>25	>33	>15	>35	>11	>28	>18	>27

Recommendation #1: *The process of translating priorities from the roadmap into calls should be more participatory, ensuring clear links between roadmaps and calls under a common process between the industrial association and the European Commission. The more focused calls in line with the needs defined in the roadmap will increase the effectiveness and the quality of proposals. An agreed, clearer timeline between the European Commission and private side is suggested, ensuring that time-sensitive priorities are fully implemented.*

3.2. Relevance and appropriateness

Relevance and Appropriateness of cPPPs was assessed using the criteria given in the ToR. The Group of Experts looked in particular at the degree of transparency, inclusion, dissemination and relevance during roadmap definition achieved by each cPPP.

All current cPPPs are based on a set of objectives outlined in their respective contractual arrangements, and linked to the specific roadmap and/or the related strategic research agenda generally drafted by the associations and linked to the respective ETP. It should be pointed out that there is no established scheduling or timeframe for the update of the objectives and roadmaps of the cPPPs (although some do) leading to different timing and levels of revision of actual needs among the cPPPs.

All cPPPs target a particular technology, or industrial sector and the roadmaps and strategic considerations need to be industry-oriented. The industrial

⁶ Taken from Commission Staff Working Document: in-depth interim evaluation of Horizon 2020 (SWD(2017) 220 final), p 106. Data referring to the 2014 calls (unless otherwise stated).

⁷ Calculated over all projects selected in the Big Data call of 2016. Both 'full members' and 'associate members' of the Big Data Value Association (BDVA) are counted as 'members', the rest as "non-members".

⁸ Approximate figures coming from 29 projects that started in 2015.

⁹ Calculated for all funded projects in 2014-2016. The non-membership participation and funding is based on the 100 members of the board of stakeholders of the PPP.

¹⁰ Relating to 2014-2016 calls.

stakeholders need to actively take part and should be willing and able to develop and use the project results in a way that facilitates market growth and job creation. In addition, the technology developed should be at a readiness level that bridges the gap between basic research and commercialisation (i.e. the "Valley of Death").

The process of defining a long-term roadmap with public consultation and approval by the representative industrial association should ensure a high level of relevance of the work programme and the corresponding calls. In this respect, transparency needs to be continuously ensured. Some of the more mature cPPPs, such as FoF, have an efficient stakeholder communication and participation mechanism in place, which could serve as best practice or base-line model for maintaining up-to-date research priorities within the cPPPs.

The cPPPs need to also stay relevant to industrial stakeholders and attract a sufficiently large number of those private for-profit entities that can engage and take up the developed foreground intellectual property (IP) for commercialisation. Table 5 shows the participation of private-for-profit entities, listed in terms of their share of overall cPPP funding. The table indicates that the funding share of industry in most cPPPs is significantly higher (e.g. 63% for 5G, 62% for EGVI, 53% for FoF and EeB, etc.) than the average funding share of industry in Horizon 2020, which is 28%.

However, the figures regarding SME participation indicate a discrepancy as in some cases their funding share is consistent with the average levels in Horizon 2020 (24%), whereas in others it is lower (e.g. 10% in Robotics, 11% in EGVI, 13% in HPC, 16% in 5G). Three out of the four sector-oriented cPPPs reach a level of funding for the benefit of SMEs which is higher than the Horizon 2020 average and are currently in line with the overall program goal (20% of the total combined budgets of the specific objective 'Leadership in Enabling and Industrial Technologies' (LEITs) and the 'Societal Challenges' going to SMEs). A more detailed analysis, which would consider the sector characteristics and the actual capacity of SMEs is needed to evaluate the optimal level of their participation

A cPPP can only be judged as relevant to the extent that a large share of the value chain is involved in the projects. This requires that beneficiaries include a wide range of actors (e.g. technology providers, intermediaries, end-users, regions, etc.) and that funding is well distributed. While comprehensive data in terms of value chain coverage would allow a more precise analysis, an available proxy is the concentration of funding. Table 5 includes data on the EU funding awarded to the first 10 and the first 50 beneficiaries in each cPPP. The data suggests a more balanced approach in EeB (14%), SPIRE (15%) and FoF (15%) than the more recently established cPPPs. Overall, there is a higher concentration on specific beneficiaries for cPPPs compared to Horizon 2020 (and FP7). Although one of the reasons may be the narrower set of activities under the cPPPs compared to the wide range of activities under the entire Framework Programmes, both contractual bodies of a cPPP should jointly ensure that there are not barriers to participation.

Table 5 – By funding (for Horizon 2020: 2014-2016 calls)

	FP7	Horizon 2020	5G	Big Data ¹¹	EeB	EGVI	FoF ¹²	HPC	Photonics	Robotics ¹²	SPIRE
% of funds to private for-profit (PRC)	25%	28%	63%	46%	53%	62%	53%	26%	44%	26%	50%
% of funds to SMEs	15%	24%	16%	19%	31%	11%	30%	13%	26%	10%	26%
% of funds to top 10 beneficiaries	8%	10%	25%	31%	14%	28%	15%	32%	25%	21%	15%
% of funds to top 50 beneficiaries	20%	22%	65%	64%	37%	58%	35%	69%	50%	56%	36%
% to top 5 countries¹³	58%	58%	70%	66%	62%	74%	67%	74%	62%	70%	57%
% funding to EU13	4%	4%	2%	5%	9%	3%	4%	3%	4%	3%	5%

There is an inherent risk of creating ‘closed clubs’, which would be in contradiction with the original intention of the cPPPs. This risk encompasses not only creating a barrier for smaller organisations with little experience in EU-level collaborative research projects, but also risks limiting the participation and engagement of entities in EU-13 states. Table 5 shows that in the cPPPs the funds allocated to EU-13 partners are on average at the same level with Horizon 2020 and FP7. The limited participation of EU-13 can be partially attributed to the requirements laid out in the call topics and the advanced level of technical readiness and collaboration capabilities. On the other hand, to reduce the risk of widening the technological gap in Europe, more effort should be made to involve as many relevant stakeholders as possible, including EU-13 based participants. Collaborative work with Member States and national/regional initiatives could be used for this purpose.

An efficient approach to increasing the inclusivity and to becoming relevant vis-à-vis the wider stakeholder community is to establish efficient communication channels. Although cPPPs are fully integrated in the Horizon 2020, allowing for data collection from projects, it is observed that the access to project results and data related to cPPP specific activities in some cases is limited. Some associations are managing very efficient platforms disseminating projects' outcomes, including marketable results, details on contributions to

¹¹ The figures for the Big Data cPPP include a European Commission contribution of approximately € 5 million to the coordinator of the Data Pitch Innovation Programme, a Europe-wide accelerator offering start-ups and SMEs funding and support for data-centric business ideas through cascading grants (<https://datapitch.eu/>). Adjusting the funding shares to take account of the final recipient would yield the following: % of funds to SMEs ca. 25.5%; % of funds to top 10 beneficiaries ca. 23.9%; % of funds to top 50 beneficiaries ca. 57.3%. Note that BDVA itself is included as a beneficiary.

¹² Cascade funding is also being used in projects linked to the FoF and Robotics cPPPs

¹³ The top 5 funded countries vary across the different cPPPs

standardisation, information on spin-offs, etc. Such platforms have been observed notably in the more mature cPPPs such as FoF, EeB and SPIRE.

Recommendation #2: *The governance of cPPPs should be revised. Associations and European Commission should enhance the transparency of the management processes, widen the debate and regularly update reference roadmaps focussing on reaching the highest number of stakeholders and the broader society. Furthermore, the systematic dissemination of results, the development of studies of exploitation and the transferability of technical solutions within the same sector and along the supply chain are strongly encouraged. Participation of SMEs and EU-13 countries should be fostered.*

3.3. Coherence with other EU related Actions

Under this assessment criterion the group looked at other existing instruments and possibilities of cooperation with the cPPPs.

The cPPPs are based on industry-oriented activities predominantly located in the Industrial Leadership Pillar of Horizon 2020, although some of them address priorities under the Societal Challenges Pillar as well. Other instruments to be considered close to the cPPPs target objectives are the Joint Technology Initiatives (JTIs), EIT Knowledge and Innovation Communities (KICs), and the SME-specific instruments in Horizon 2020 (Fast Track to Innovation and the SME Instrument). At the same time, a stronger connection with the smart specialization strategies and structural funds would largely increase their impact on European industry.

Various forms of interaction with other EU related actions are reported by the cPPPs, and more robust collaboration such as joint calls across cPPPs is also taking place.

In table 6, some examples of joint topics and joint calls are identified during the assessment period. The joint calls are predominantly between some of the cPPPs although examples with other Pillars can be found.

Table 6 – Examples of joint calls between cPPPs and across different work programme parts

Topic code	Description	Work Programme components or cPPPs involved
FoF-01-2014	ICT Innovation for Manufacturing SMEs (I4MS)	FoF and Robotics
FoF-09-2015	ICT Innovation for Manufacturing SMEs (I4MS)	FoF and Robotics
FoF-12-2017	Process optimisation of manufacturing assets	FoF and Photonics
FoF-13-2017	Photonics Laser-based production	FoF and Photonics
SFS-05-2017	Robotics Advances for Precision Farming	Robotics and SC2 ¹⁴

In general and apart from joint calls, other links and initiatives, especially in terms of technical and non-technical priorities would be desirable between all cPPPs and other instruments, in particular the JTIs.

Links between the KICs and the cPPPs are indirectly achieved through the participation of some association members that act as core partners in specific KICs. For example SPIRE core members are core members in the Climate KIC (Bayer, TNO), Digital KIC (VTT) and KIC InnoEnergy (Eindhoven TU). Some KICs (EIT Digital, EIT Energy and EIT Raw Materials) also share interests with the FoF and BigData cPPPs, and priorities are linked. More and structured links between cPPPs and KICs will improve the impact on European competitiveness.

As discussed earlier in section 1.3, the nine cPPPs can be grouped in sector-oriented and technology-oriented. Technology-oriented cPPPs interact with application fields of sector-oriented cPPPs. High potential for innovation and added value exists when these two groups collaborate. However, the Expert Group was only able to identify joint calls between FoF, Photonics and Robotics. As these joint calls have been successfully implemented for some cPPPs it would be desirable to enlarge the good practices and learning to further joint calls applied to other cPPPs (e.g. Big Data vs FoF or Photonics vs EGVI).

Recommendation #3: *The links between the cPPPs and the other European Commission instruments should be strengthened. The European Commission should take action (e.g. mapping synergies) to develop joint programming, cross-fertilisation and partnerships.*

3.4. Effectiveness

The Expert Group looked at effectiveness of cPPPs mainly through the lens of the KPIs, in particular those that are cPPP specific, as the KPIs are among the most important tools for monitoring the progress of the cPPPs objectives.

¹⁴ SC2: Societal Challenge 2, "Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy"

The Expert Group focussed in more detail on KPIs specific to individual cPPPs, which were subject of the contractual agreement between the European Commission and the private counterpart.

These KPIs are programmatic in the sense that they tend to aggregate KPIs and performance of many projects, and include non-project metrics, such as performance of the association, post-project outcomes and impact related KPIs, sometimes of a macro-economic nature (market share, jobs).

It is a task for the European Commission to collect project level KPIs. The majority of KPIs related to performance beyond the contractual reporting requirements are collected by the associations, for instance through surveys. These KPIs include:

- Private investment;
- Number of jobs and curricula created;
- Increased turnover in SMEs;
- Number of new innovations to market.

Examples of some the main KPIs as reported by the cPPPs in the monitoring reports is presented in Figure 1:

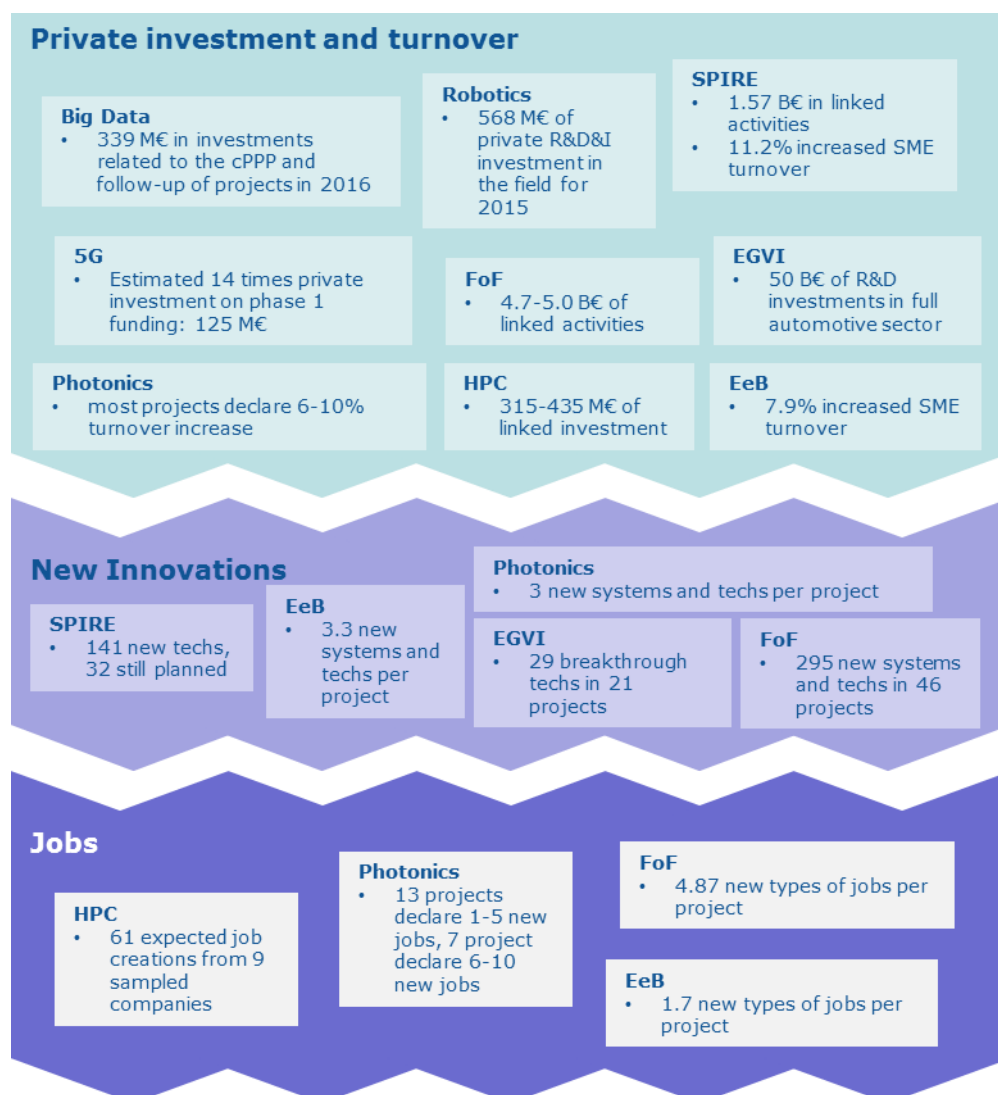


Figure 1. Examples of reported KPI estimates from the latest monitoring reports

The Expert Group looked at the nature of the KPIs and the methodology employed by various associations for collecting and/or deriving the data for the KPIs.

The objectives and KPIs described in the contractual agreements between the European Commission and the private side clearly communicate and capture the right level of ambition the cPPPs had at their inception stage to achieve, over time, macro-economic and societal impact.

The Expert Group acknowledges the positive effect of the existence of the KPIs has achieved so far in defining industrial R&D communities, roadmaps, priorities and investment approaches. However, it is still too early to fully measure the impact of cPPPs since participants are now at various stages of executing projects. Some signs of impact are starting to appear for the more mature cPPPs and it is reasonable to assume impact will start to emerge for the other cPPPs in the next few years. The Expert Group recommend operating a post-project evaluation for the more mature cPPPs.

The Expert Group also recognises that these programme-level KPIs for cPPPs were defined at the very early stage of this new instrument without the operational insight that the European Commission and associations now have at their disposal.

It has been observed with a certain consistency that associations have found it hard to collect KPIs from projects. For instance, it seems too early to establish causality between macro-economic indicators (e.g. market share) and projects, or aggregate project-level KPIs of a very diverse set of projects into common programme-level KPIs. The project consortia should define and collect project level KPIs, while the associations should track overall progress.

The Expert Group also notes, that one of the most important KPIs for cPPPs, industry leverage, has been difficult to collect and assess consistently and in a more reliable way for many cPPPs. Moreover, the methodology is currently not harmonised between the different cPPPs. In some cases, for instance, the associations used the whole R&D investment in Europe as a match, irrespective of whether it is directly related to the cPPP or not. In addition, it is recognised that the target leverage factor takes time to be achieved, especially since the company investment may follow only after the completion of a project. This increases the difficulty of monitoring progress during the implementation of the projects.

The Expert Group agrees that more mature cPPPs have more established approaches to KPIs, including adoption of tools such as the Innovation Radar and the Exploitation Toolkit (e.g. FoF/EFFRA). However, they also experience many of the same challenges as younger cPPPs.

In the interviews, these experiences have been raised by representatives of the cPPP associations, expressing their wish to re-examine the cPPP KPIs together with the European Commission in the near future.

Based on these observations and in order to provide an even stronger and more focussed set of incentives and better evaluation of impact, KPIs should be smart, prioritised and could be structured into KPIs common to all cPPPs and KPIs specific to each cPPP, with timelines, measurement protocols and increased contractual responsibilities on participants and associations to report regularly and transparently.

Recommendation #4: *The Expert Group strongly recommends redesigning the KPI framework of all cPPPs. The redesign process should be coordinated by the European Commission and start soon after the publication of this report.*

3.5. EU Value Added

The EU value added is the additional value for European smart, sustainable and inclusive growth and global competitiveness resulting from the existence of the cPPPs, compared to what would have been achieved without them. When trying to evaluate the impact that the creation of these partnerships has achieved, the Expert Group has identified two areas to review:

- The effect cPPP have had in creating networks, both individually and as a group of cPPPs;
- The influence of cPPPs in national and regional policies.

cPPPs have achieved a significant positive impact, enhancing interactions between different stakeholders from the same technological field or sector, resulting in pan-European networks comprising industries, both large companies and SMEs, Research and Technology Organisations (RTOs), universities, and other stakeholders relevant to the activity of the partnership. This means that the consolidation of Public/Private networks at European level, already created by ETPs, offers a framework for easy cooperation between actors of the value chain.

These networks also have a multiplying effect towards the entire ecosystem, representing a kind of marketplace between research and industry, leading to fruitful collaborations: it is also possible to tighten existing relations between complementary stakeholders in the supply chain, or to create new business opportunities between different stakeholders (i.e. SME suppliers with large end-users such as contractors, etc.). Neither a single company nor a European country alone would be able to mobilise such dynamics to contribute to reaching an EU-level target.

An important role that the cPPPs are playing to this extent is the contribution to the development of industrial development roadmaps for Europe at national and regional levels. Some cPPPs have engaged national stakeholders in Member States during the preparation of the multiannual roadmaps through involvement of national multipliers, like national technology platforms. As a consequence, some Member States and regions have taken inspiration from the multiannual roadmaps when defining local priorities within the smart specialisation strategy. This could have a positive effect on engaging entities from low performing countries in cPPP initiatives. However, a stronger involvement of Member States should not be to the detriment of the current flexibility and speed of decision of the cPPP instrument, as required by industry.

In the case of mature cPPPs, like FoF, there is a clear impact on national policies through the creation of dedicated initiatives related to Factories of the Future. This is promoted by the EFFRA membership, which actively establishes a dedicated forum for contributing to national policies and research programmes.

However, there are big variations in the level of contribution of that each cPPP to national strategies in various Member States, also depending on the relative size of cPPPs budgets with respect to national ones. In this regard, the impact of cPPPs on national and regional policies derived from the activities under Horizon 2020 is not very clear. This applies also to recently established cPPPs (with some

exceptions), who have not yet had the possibility to create an effective dissemination network and framework for transfer of results and best practices to a national and regional agenda, or vice versa.

Recommendation #5: *In order to enhance the impact of the cPPPs on national and regional policies as a way to increase their EU value-added, Member States should be represented in the cPPPs. The Commission should explore jointly with Member States suitable mechanisms.*

4. CPPP MULTIDIMENSIONAL ANALYSIS

To offer a clearer view of the comprehensive evaluation at the basis of the recommendations, the Expert Group has developed a multi-dimensional analysis of all cPPPs (Table 7). The table is not meant to give a detailed and exhaustive evaluation of the single cPPP, since the limited time has not allowed a sufficiently robust comparison in each analysed dimension. The table however, provides a holistic, multidimensional view, proposing a common base model of behaviour and organisation and evidencing the areas in which differences emerge more clearly, as well as those where best practices, or critical issues, are diffuse.

*The Group built its horizontal conclusions as on assessment of each cPPP. This assessment is summarized in the table below. It should however **not be construed in a way specifying a failure or success of a particular cPPP**. The criteria related to 'Well on Track' and 'Shift to Gear' only provide a proxy of the maturity and characteristics of each cPPP in a mid-term review under Horizon 2020.*

"Challenging Roadmaps" (that can be read also as Governance of the Roadmaps Definition process), "KPI reporting" and in particular "Measurement of the Leverage KPI", as well as "Inclusion of SMEs", emerge as the dimensions in which several cPPPs could improve their organization and/or functioning. As it emerges from the table, however, even regarding to these "more critical" issues, for some cPPPs the Group has registered a good level of performance, with the exception of the KPIs definition and measurement.

In "Interaction and coordination with other Horizon 2020 instruments", together with "Inclusion of EU13", evaluations are more balanced among the different cPPPs. An improvement in the overall level of cross-fertilization, although already present in some of the cPPPs, would surely increase their EU value added.

Finally, in the other dimensions considered, openness, representativeness, communication of results and access to information, the cPPPs have generally showed a higher level of maturity, although, especially for some of them, this does not exclude the need of further improvements.

It is worth noting, that part of the analysis and relative recommendations, as for example the degree of achievement of KPIs and the impact on national and regional policies, as well as the role of Member States, do not fit Table 7. Indeed, these dimensions, widely discussed in the Group, required an overall evaluation and could not be easily disaggregated for each cPPP.

Table 7. Multi-dimensional analysis of all cPPPs. Evaluation levels: **WOT**=“Well on Track”, **STG**=“Shift the Gear” and **NE**=“Not evaluable”.

Evaluation dimension	5G	BigData	EeB	EGVI	FoF	HPC	Photonics	Robotics	SPIRE
Open discussion on roadmaps	WOT	WOT	WOT	NE	WOT	WOT	WOT	WOT	WOT
Challenging and updated roadmaps	WOT	WOT	STG	STG	WOT	NE	WOT	WOT	STG
High number of industry and RTO (representativeness)	WOT	WOT	WOT	STG	WOT	STG	WOT	WOT	WOT
Portal of project results	WOT	NE	WOT	STG	WOT	WOT	WOT	WOT	WOT
Dissemination activities	WOT	WOT	WOT	NE	WOT	WOT	WOT	WOT	WOT
KPI reporting	WOT	STG	WOT	STG	STG	STG	WOT	STG	WOT
Methodology to compute Leverage KPI	STG	STG	STG	STG	STG	STG	STG	STG	STG
Easy access to information and membership (newcomers)	WOT	WOT	WOT	WOT	WOT	WOT	WOT	WOT	WOT
Links to other cPPPs and EU Actions and Instruments	STG	WOT	WOT	WOT	WOT	WOT	WOT	WOT	STG
Inclusion of SMEs	STG	WOT	WOT	STG	WOT	STG	WOT	STG	WOT
Inclusion of EU13	STG	WOT	WOT	STG	WOT	WOT	WOT	STG	WOT

5. CONCLUSIONS

Although a relevant part of the impact of cPPPs has still to materialize and there are differences from one cPPP to another, they have broadly achieved the purpose for which they were created. That is a more structured shift from a top-down to a bottom-up approach in defining R&I European strategies, spanning the whole innovation cycle and relevant actors. Nevertheless, the European Commission and the Industry Association should take concrete actions on some of the dimensions analysed, especially governance, transparency, challenging roadmaps and KPIs definition.

Overall the management of cPPPs has been efficient. In terms of time to grant and success rates they have performed slightly better than the average of Horizon 2020. Areas of improvements include more focused and dynamically updated roadmaps and more continuity between roadmaps and calls.

The Expert Group underlines that more clarity over institutional status and a reformed model of governance is required to improve transparency and openness. Moreover, the Expert Group has found evidence that, in some cases, the goals developed under the cPPPs could be more challenging.

Although cPPPs are fully integrated in Horizon 2020, results and data from projects are not easy to access. A common access point where information about projects and relevant data is shared with the public would increase their impact on European Industry.

With respect to effectiveness and impact, the Expert Group recommends redesigning and harmonising the KPIs. A more robust monitoring of the KPIs would increase results and impact in the short and medium term. They must be challenging, realistic, measurable and updated so to ensure an adequate response to technology evolution and industry needs.

cPPPs should be integrated in a more coherent strategy of priorities and objectives with other EU instruments, avoiding duplication and overlapping and exploiting synergies with national and regional policies.

The Expert Group suggests that to increase European value added of cPPPs, and to ensure a closer link between roadmaps and regional and national policies, a wider involvement of Member States is desirable. This is especially important in building synergies with structural funds.

Finally, the Expert Group believes that the recently proposed mission-oriented approach (in the FAB-APP-LAB Report) would empower the cPPPs, providing a proper base to improve their efficiency and effectiveness along the lines recommended by this Group.

Acknowledgments: The Expert Group unanimously wishes to thank the DG-RTD and DG Connect, which have provided support, expertise and most of the data, on which this Report is based. The Group also wishes to thank the MEPs Cabezón Ruiz and Ehler for their availability and interest in the discussions related to our review.

Annex 1. Recommendations from the Final assessment of the research PPPs in the European Economic Recovery Plan

Final of the research PPPs in the European Economic Recovery Plan in 2013	<u>Actions taken</u> when implementing cPPPs in Horizon 2020
(Factories of the Future, Energy-efficient Buildings, European Green Cars Initiative)	
The governance model needs to be formalised to recognise the contribution and commitments of the various actors involved in order to guarantee the long term sustainability and impact within the sectors of the partnership.	Contractual arrangements were signed between the associations and the European Commission where objectives and key performance indicators (KPIs) were agreed. The former ad hoc industrial advisory board was formalised in the partnership board
The research PPP model should be further used, developed and expanded in scope within Horizon 2020 and provided with sufficient funding to achieve a significant industrial effect.	The number of PPPs has been tripled and a higher level of European Commission contribution was devoted to them. Impact on European Industry not yet evaluated.
The PPPs should work under the Horizon 2020 common rules, but their procedures need to be further streamlined and simplified to increase the relevance of the PPPs to industry and to broaden the appeal to a wider sub-set of the relevant value chain.	cPPPs continue to operate through Horizon 2020 common rules, although there is still room for improvement on simplification.
The research PPPs in Horizon 2020 need to focus on actions which strengthen innovation activities and the likelihood of European based products and services eventually reaching the markets.	cPPPs calls in Horizon 2020 on average have higher TRLs than the rest of the programme. Measurement of innovation and market impact need additional analysis.
In order to maximise the benefits and widen the participation in the research PPP activities and results, awareness about the research PPPs needs to be strengthened, particularly among the often hard-to-reach Small and medium enterprises (SMEs).	In general the cPPPs project results have been made public by several associations through dedicated workshops or databases available at the cPPPs website. However, further improvement is required as well as project results implementation follow up for all cPPPs, particularly the older ones.
SMEs are critical to the industrial competitiveness of Europe and they increase the geographical spread of organisations involved along the key value chains.	SME participation and share of funding vary among the cPPP (some above and some under than average Horizon 2020 calls). Geographical spread has not been improved.

Annex 2. Terms of Reference

1. Context and background information:

The appointment of the "Commission expert group on the mid-term review of the contractual Public-Private Partnerships in Horizon 2020" (henceforth "the Expert Group") will be financed according to the provisions of the updated Horizon 2020 Work Programme 2016-2017, Part 5.ii 'Leadership in enabling and industrial technologies – Nanotechnologies, Advance Materials, biotechnology and Advance Manufacturing and Processing', Other actions, Action 5, "Mid-term review of the Contractual Public-Private Partnerships" (cPPPs) (European Commission Decision C(2017)XXX of XXX April 2017).

This document establishes the Terms of Reference for the Expert Group on the mid-term review of nine of the contractual Public-Private Partnerships (cPPPs) running under Horizon 2020, with the involvement of a Group of High Level Independent Experts. Those cPPPs are: Factories of the Future, Energy-efficient Buildings, European Green Vehicles Initiative, Sustainable Process Industry, 5G Infrastructure, Robotics, Photonics, High Performance Computing and Big Data Value. DG RTD is the lead service for the first four cPPPs and DG CNECT is the lead service for the remaining five. The cPPP on Cybersecurity, which was only signed on 5 July 2016, does not foresee any mid-term review and, therefore, is not included.

The creation of the cPPPs is based on the criteria set out in Article 25 of the Regulation establishing Horizon 2020. For each of the above mentioned cPPPs, a Contractual Arrangement was signed between the Commission and an association representing the private side of the partnership. The Contractual Arrangements define the broad scope, specific objectives, activities, investment and foreseen outputs for each cPPP, as well as their governance, specific commitments of both parties, progress monitoring mechanisms, application provisions, duration and review. The annex to the Contractual Arrangement is a multi-annual roadmap which provides the basis to develop the cooperation.

2. Purpose, objectives and scope:

The overall objective is to carry out the mid-term review of the nine cPPPs in agreement with point 9 of the respective Contractual Arrangement. The review will be carried out by the Expert Group, composed of a group of high-level independent experts, who will produce a mid-term review report providing conclusions and recommendations to the Commission. On the basis of the review, the Commission may request amendments to any of the contractual arrangements or decide its termination. The preliminary draft and the final version of the review report will be provided to DG RTD, unit D2 coordinating the cPPPs. The recommendations and conclusions will be used as inputs for improving the current initiatives, as well as for potential future initiatives.

The interim and final assessments carried out previously for the Research PPPs of the Recovery Plan under FP7 were based on the corresponding assessments of the Joint Technology Initiatives (JTIs). The cPPPs have now evolved, and are substantially different to the JTIs in their implementation, such as work programme preparation, project evaluation and monitoring. As a substantial and integrated part of Horizon 2020, and following the Better Regulations package, this evaluation will address five main criteria – efficiency, relevance, coherence, effectiveness and EU added-value of each cPPP.

The main tasks of the Expert Group are the following:

- Assess the **efficiency** (including aspects such as **implementation and supervision**),
 - and review whether the specific objectives and specific commitments set up in the correspondent Contractual Arrangement will be met by the end of each cPPP.
- Assess the **continued relevance and appropriateness** of the cPPPs in line with the individual contractual arrangements, and the yearly monitoring reports
- Assess the **coherence with other initiatives and actions which are thematically related** to the cPPPs
- Assess the **effectiveness** of each individual cPPP and **their contribution to the general policy objectives** of the Union, in particular the Horizon 2020 objectives
- Assess **the impact** of the cPPPs **in terms of the value added**:

- In particular at a **European level**
- but also at national and regional level, as well as at an international level
- The added-value of all the cPPPs together should also be assessed.
- Provide **short and longer term recommendations** for the future of the cPPPs and any future potential research programming initiatives (if applicable).

It is not foreseen that this review will consider in detail the individual projects that have been funded to date under the initiatives. However, consideration should be given to whether the portfolio of funded projects meets both the broad scope and specific objectives set out for each cPPP under its contractual arrangement.

The Expert Group is asked to develop concrete conclusions and recommendations.

3. Working approach and methodology

The Expert Group will address the mid-term review of nine of the cPPPs currently running under Horizon 2020. It shall be composed of nine independent experts – with some experts having specific expertise relating to some of the areas linked to the cPPPs and some experts having a more generalist profile.

It is foreseen that each cPPP will be individually reviewed by at least three of the independent experts. One of the experts will be assigned the role of "Chairperson" and will be in charge of defining the appropriate methodology and another expert will act as "Rapporteur" in order to ensure a uniform approach across the entire review process.

The Commission staff organising the mid-term review carried out by the Group will be in regular contact with its members, and in particular with the Rapporteur, to ensure the smooth execution of the review activities and will attend the meetings to provide appropriate information and orientations. The review will be designed and carried out in line with the relevant Commission standards for evaluation and subject to the quality assessment criteria.

The Commission will provide the Expert Group with all necessary information, including (non-exhaustive list):

- Communications on cPPPs;
- Article 25 of the Regulation establishing Horizon 2020;
- Contractual Arrangements between the private side of each cPPP and the European Commission;
- Multi-annual roadmap of each cPPP;
- Relevant Horizon 2020 Work Programmes;
- 2014 and 2015 Progress Monitoring reports for each cPPP;
- 2016 draft Progress Monitoring report for each cPPP when available;
- Other documentation relevant to the Horizon 2020 calls (e.g. statistics);
- Meeting minutes of the Partnership Boards;
- Interim and Final assessment reports carried out under the Recovery Plan;
- Reports of the yearly Impact Workshops;
- Other relevant PPP-related documents as needed

In addition, experts may provide other evidence-based data.

4. Distribution of the work among the experts:

The Commission has nominated a Chairperson and a Rapporteur for the Expert Group for the entire review of all cPPPs. The Chairperson will propose the working methods and agenda, coordinate the discussions of the Expert Group and ensure that the expertise of its members is best exploited to allow an in-depth analysis of the implementation of the cPPPs.

Via a combination of collective and individual work punctuated by three meetings, the Expert Group will analyse existing evidence and documents relating to the cPPPs, including progress towards the objectives set under the Contractual Arrangements, the corresponding multi-annual roadmap, the Progress Monitoring reports for 2014, 2015 and, possibly, 2016 for each cPPP, the relevant Horizon 2020 Work Programmes, ad hoc analyses, statistical information and relevant policy documents and reviews.

The role of the Rapporteur will be to draft a single final report of the Expert Group (maximum 60 pages covering all cPPPs, including annexes), on the basis of the contribution by all members and of the relevant evidence identified by the Expert Group's members and/or the Commission. The Rapporteur will identify and integrate the main arguments provided by the experts and draft summaries of the discussions held at the meetings. The Rapporteur will be responsible for the preparation (compiling and editing) of a single report covering all cPPPs to be assessed and produced by the Expert Group, in close cooperation with all its members.

5. Meetings, reporting and deadlines:

In terms of timeline, the kick-off meeting is expected to be organised by April 2017, with the final report due by end of September 2017. The Expert Group should already have a preliminary draft of the review report by mid-July 2017 in order to be able to consider feedback from the Commission and relevant stakeholders. Up to three other intermediate meetings would be organised in Brussels taking into consideration the above deadlines.

6. Experts profiles:

The independent experts were appointed on the basis of the following criteria:

- expertise in relation to the strategic relevance of the cPPPs;
- expertise in the field of programme evaluation and management as evidenced by academic and professional experience and skills;
- appropriate range of skills in the fields covered by the cPPPs, combined with the ability to examine questions related to science, technology and industrial policy as well as analyse the general context (legislative, socio-economic, political, etc.) into which they fall;
- appropriate language skills.

Once the above four conditions were satisfied, other criteria were also taken into consideration:

- appropriate balance between academic and industrial or technological expertise;
- a fair gender balance;
- a reasonable geographical balance

Each expert shall be free of any conflict of interest in assessing the progress of any of the cPPPs, in accordance with Article 11 of the Commission Decision C(2016)3301.

7. Experts short biographies:

Name	Nationality and Gender	Short biography
Proposed experts		
Paolo Annunziato (Chair)	IT, Male	<ul style="list-style-type: none"> • UAE Government, Ministry of Economy (Dubai): Research and Innovation policy expert. Advisor to the Minister. • Former Director-General of CNR, Italy • Former Senior Group Vice President for Public and Economic Affairs in Telecom, Italia. • Former Director for R&I in Confindustria
Carmen Constantinescu (Rapporteur)	RO, DE, Female	<ul style="list-style-type: none"> • Leader and Representative of the Strategic Area "Digital Manufacturing 4.0", at Fraunhofer Institute for Industrial Engineering, Stuttgart • Associate Professor at Technical University of Cluj-Napoca, Romania, Faculty of Machine Building (since 2005) • Professor at Royal Institute of Technology (KTH), Stockholm, Sweden, Dec 2014 – to Dec. 2016 • Evaluation Independent Expert in National and European Commission Frameworks Programmes • 2013, October - Member, High Level Steering Committee of the Let's 2014 ("Leading Enabling Technologies for Societal challenges") • Member of the German Standardisation and Normalisation VDI – Expert Groups "Digital Factory" and "Modelling and Simulation"
Jürgen Lexow	DE, Male	<ul style="list-style-type: none"> • Member of the Presidential Staff Office in charge of Research Coordination • Chairman of the Mirror Group of the European Technology Platform on Industrial Safety (ETPIS) • Member of the Steering Committee of the Versailles Project on Advanced Materials and Standards (VAMAS) • Evaluation of contractual PPPs, 12th July 2013
Margarida Pinto	PT, Female	<ul style="list-style-type: none"> • Head of R&D Department at ISQ-Instituto de Soldadura e Qualidade • National delegate for Horizon 2020 Transport Programme Committee 2015-2016 • ACARE Member State representative until 2016 • Member of the National Transport Programme Committee Advisory Group • International collaboration on Lead-Free soldering with NASA in US (JGPP-Joint Group for Pollution Prevention) • Evaluation Independent Expert in National and European Commission Frameworks Programmes

Guillermo Alvarez	ES, Male	<ul style="list-style-type: none"> • Head of Department for Societal Challenges CDTI • Project Manager in Exxentia Grupo Fitoterapéutico, S.A. • Spanish National Contact Point for the NMP Program FP7 • Spanish representative to the Horizon 2020 Energy Program Committee 2014-2015
Leena Sarvaranta	FI, Female	<ul style="list-style-type: none"> • Vice President EU Affairs, VTT Technical Research Centre of Finland • Member of the Strategic Research Council, Academy of Finland • Member of the National Foresight Steering Group, Finland • Member of the Sherpa Group for KETs HLG, appointed by the European Commission in 2010-2011 and 2013-2015
Rossitza Setchi	BU, Female	<ul style="list-style-type: none"> • Professor, Cardiff University • Special Fields: Internet of things; Cyber-physical systems; Smart manufacturing; Digital factories. • Director, Mechanics, Materials and Advanced Manufacturing and Leader of High-Value Manufacturing • Evaluation Expert for ICT FP7
Bert Witkamp	NLD, Male	<ul style="list-style-type: none"> • Project Coordinator at EAFO European Alternative Fuels Observatory • Secretary General at AVERE • Owner at Valuad Spri • CEO Machiels Industries at Group Machiels
Maurizio Pilu	IT & UK, Male	<ul style="list-style-type: none"> • Digital technologist, R&D, innovation, strategy, investment and commercialization • Experience include VP Digital Innovation at LR Group, founder and exec director of UK's national innovation centre, Digital Catapult, technology and strategy at the UK's innovation agency Innovate UK, Hewlett Packard Laboratories, early-stage venture capital, ST Microelectronics • IET Fellow • Co-inventor of over 35 international technology patents over 30 peer-review publications

Annex 3. Information Sources (non-exhaustive list)

I. General Documents:

1. Article 25 of the Regulation (EU) No 1291/2013 of the European Parliament and the Council establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC
2. Communication COM(2014) 442 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'Towards a thriving data-driven economy'
3. Communication COM(2016) 176 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Towards a thriving data-driven economy: 'ICT Standardisation Priorities for the Digital Single Market'
4. Communication COM(2016) 178 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'Towards a thriving data-driven economy: European Cloud Initiative - Building a competitive data and knowledge economy in Europe'
5. Communication COM(2016) 180 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'Digitising European Industry. Reaping the full benefits of a Digital Single Market'
6. Communication COM(2016) 588 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: '5G for Europe: An Action Plan'
7. Communication COM(2017) 9 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'Building a European Data Economy'
8. Working document SEDEC-VI/026: 13th meeting of the Committee of the Regions' Commission for Social Policy, Education, Employment, Research and Culture Local and Regional Dimension of Horizon 2020 and the New Framework Programme for Research and Innovation, 31 March 2017
9. EARTO's position paper: 'How Joint Undertakings boost RTOs-Industry Collaboration & Leverage Private RD&I Investments in Europe'
10. Opinion of the European Economic and Social Committee CCMI/142 – EESC-2016-00470-00-00-AC-TRA (IT) 1/10: 'Role and effect of JTIs and PPPs in implementing Horizon 2020 for sustainable industrial change'
11. European Parliament's Committee draft resolution on the assessment of Horizon 2020 implementation in view of its interim evaluation and the Framework Programme 9 proposal (2016/2147(INI)), 6.3.2017
12. European Parliament resolution of 13 June 2017 on the assessment of Horizon 2020 implementation in view of its interim evaluation and the Framework Programme 9 proposal (2016/2147(INI))
13. European Parliament Research Service's briefing: 'Contractual public-private partnerships in research', PE 603.934, May 2017
14. European Parliament Research Service 'At a glance paper': 'Contractual public-private partnerships in research', PE 603.937, 2017
15. Final Assessment of the Research PPPs in the Recovery Plan: Factories of the Future, Energy-efficient Buildings and European Green Cars Initiative by the European Commission's Directorate-General for Research and Innovation; Directorate G - Industrial Technologies; Unit G.2 - 'New forms of production', KI-02-13-270-EN-C, 2013
16. European Commission Decision C(2014)4995 of 22 July 2014: Horizon 2020 Work Programme 2014 – 2015: 'Future and Emerging Technologies'

17. European Commission Decision C(2015)8621 of 4 December 2015: Horizon 2020 Work Programme 2014 – 2015: European research infrastructures (including e-Infrastructures) revised
18. European Commission Decision C (2015)2453 of 17 April 2015: Horizon 2020 Work Programme 2014 – 2015: Information and Communication Technologies revised
19. European Commission Decision C(2017)2468 of 24 April 2017: Horizon 2020 Work Programme 2016 – 2017: 'Future and Emerging Technologies'
20. European Commission Decision C(2017)2468 of 24 April 2017: Horizon 2020 Work Programme 2016 – 2017: European research infrastructures (including e-Infrastructures)
21. European Commission Decision C(2017)2468 of 24 April 2017: Horizon 2020 Work Programme 2016 – 2017: Information and Communication Technologies
22. European Commission Final Report of the 'Study on Innovation in Horizon 2020 Projects. A content analysis of 233 innovation project proposals awarded in 2015' by Christoph Grimpe, Wolfgang Sofka and Andreas Distel, Copenhagen Business School, Denmark, March 2017
23. Interim Assessment of the Research PPPs in the European Economic Recovery Plan Energy-efficient Buildings, Factories of the Future and European Green Cars Initiative by the European Commission's Directorate-General for Research and Innovation; Directorate G - Industrial Technologies; Unit G.2 - 'New forms of production', KI-32-11-766-EN-C, 2011
24. Issue papers for the High Level Group on maximising the impact of EU research and innovation programmes prepared by the R&I family Directorates-General of the European Commission, 3 February 2017
25. 'An Ambitious FP9 Strengthening Europe's Industrial Leadership', Joint Declaration by Industry and RTOs, 7 June 2017
26. Position papers submitted by stakeholders for the Public stakeholder consultation – interim evaluation of Horizon 2020
27. 'LAB – FAB – APP – Investing in the European future we want', report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes, July 2017
28. Technopolis Group report: 'Increased coherence and openness of European Union research and innovation partnerships', June 2017

II. cPPP specific documents

5G

1. Contractual arrangement setting up a Public Private Partnership in the area of advanced 5G network infrastructure for the future internet between the European Union and the 5G Infrastructure Association, 17 December 2013
2. 5G cPPP Progress Monitoring Reports 2014, 2015, 2016
3. European Commission factsheet: '5G Infrastructure PPP: The next generation of communication networks will be "Made in EU"'
4. 5G PPP Architecture Working Group, View on 5G Architecture, Version 1.0, July 2016
5. '5G innovations for new business opportunities', a paper by the 5G Infrastructure Association
6. White Paper on Energy Vertical Sector '5G and Energy' by the 5G Infrastructure Association, September 2015
7. White Paper on Automotive Vertical Sectors by the 5G Infrastructure Association, 20 October 2015

8. White Paper on eHealth Vertical Sector by the 5G Infrastructure Association, September 2015
9. White Paper on 5G and the Factories of the Future by the 5G Infrastructure Association, 2015
10. White Paper on Media Entertainment Vertical Sector by the 5G Infrastructure Association, January 2016
11. White Paper on Specialized Services, Network Management and 5G by the 5G Infrastructure Association, May 2015
12. Replies by 5G Infrastructure Association to the cPPP -related questionnaire issued in March 2017 by the European Commission
13. Summary Report and Operational Conclusions of the 1st Partnership Board of the Contractual Public-Private Partnership on "5G", 18 September 2014
14. Summary Report and Operational Conclusions of the 2nd Partnership Board of the Contractual Public-Private Partnership on "5G", 13 October 2014
15. Summary Report and Operational Conclusions of the 3rd Partnership Board of the Contractual Public-Private Partnership on "5G", 4 December 2014
16. Summary Report and Operational Conclusions of the 4th Partnership Board of the Contractual Public-Private Partnership on "5G", 13 February 2015
17. Summary Report and Operational Conclusions of the 5th Partnership Board of the Contractual Public-Private Partnership on "5G", 2 July 2015
18. Summary Report and Operational Conclusions of the 6th Partnership Board of the Contractual Public-Private Partnership on "5G", 2 October 2015
19. Summary Report and Operational Conclusions of the 7th Partnership Board of the Contractual Public-Private Partnership on "5G", 11 March 2016
20. Summary Report and Operational Conclusions of the 8th Partnership Board of the Contractual Public-Private Partnership on "5G", 8 September 2016
21. Summary Report and Operational Conclusions of the 9th Partnership Board of the Contractual Public-Private Partnership on "5G", 11 January 2017

Big Data

1. Contractual arrangement setting up a Public Private Partnership in the area of data between the European Union and the Big Data Value Association, 13 October 2014
2. Big Data cPPP Progress Monitoring Reports 2014, 2015, 2016
3. European Commission factsheet on Data cPPP, 2014
4. European Big Data Value cPPP - Strategic Research and Innovation Agenda - July 2014
5. European Big Data Value cPPP - Strategic Research and Innovation Agenda - January 2015
6. European Big Data Value cPPP - Strategic Research and Innovation Agenda - January 2016
7. European Big Data Value cPPP - Strategic Research and Innovation Agenda - January 2017
8. Replies by Big Data Value Association to the cPPP-related questionnaire issued in March 2017 by the European Commission
9. Minutes of the Big Data Value Public Private Partnership Board meeting, 14 April 2015
10. Minutes of the Big Data Value Public Private Partnership Board meeting, 17 June 2015

11. Minutes of the Big Data Value Public Private Partnership Board Meeting, 12 November 2015
12. Minutes of the Big Data Value Public Private Partnership Board meeting, 2 March 2016
13. Minutes of the Big Data Value Public Private Partnership Board meeting, 1 July 2016
14. Minutes of the Big Data Value Public Private Partnership Board meeting, 29 November 2016

Energy Efficient Buildings

1. Contractual arrangement setting up a Public Private Partnership in the area of Energy Efficient Buildings between the European Union and the Energy efficient Buildings Association A.I.S.B.L. (E2BA), 17 December 2013
2. Multi-annual roadmap for the contractual PPP under Horizon 2020 - Energy Efficient Buildings, 2013
3. Energy Efficient Buildings cPPP Progress Monitoring Report 2014, 2015, 2016
4. European Commission factsheet 'The Energy-efficient Buildings PPP: research for low energy consumption buildings in the EU', 2013
5. European Commission Report of the Workshop on the Impact of the Energy-efficient Buildings Public- Private Partnership, 18-19 April 2016
6. Replies by E2BA to the cPPP-related questionnaire issued in March 2017 by the European Commission
7. Summary Report and Operational Conclusions of the 10th Meeting of the Partnership Board for the Contractual Public-Private Partnership on "Energy- efficient Buildings", 21 November 2016
8. Summary Report and Operational Conclusions of the 11th Meeting of the Partnership Board for the Contractual Public-Private Partnership on "Energy- efficient Buildings", 17 March 2017
9. Summary Report and Operational Conclusions of the 12th Meeting of the Partnership Board for the Contractual Public-Private Partnership on "Energy- efficient Buildings", 18 May 2017#

European Green Vehicles Initiative

1. Contractual arrangement setting up a Public Private Partnership in the area of European Green Vehicles Initiative between the European Union and the European Green Vehicles Initiative Association (EGVIA), 17 December 2013
2. European Green Vehicles Initiative cPPP Progress Monitoring Report 2014, 2015, 2016
3. ERTRAC Vision 'Future Road Transport 2050', 24 April 2017
4. Agenda of the EGVIA conference : 'European funded project results: Reduction of CO2 emissions from Heavy-Duty Trucks' of May 31st 2017
5. Presentation of the Report by the ERTRAC CO2-Evaluation Group on the CO2 Integrated Approach, 2017
6. Composition of the EGVIA Partnership Boards
7. EGVIA Impact Assessment of the European Green Cars Initiative, 2016
8. ERTRAC 2017 Annual conference - Press release

9. EGVIA press release - Joint European Commission & EGVIA workshop for advanced automotive batteries research - European projects' contributions to the key user requirements, 12 October 2016
10. EGVIA press release: 'TRA 2016 - Invited session on Impact assessment and success stories from Green Cars Initiative'
11. EGVIA Statutes, 5 December 2012
12. ETRAC Report: Insights from the FOSTER-ROAD Innovation, 12 December 2016
13. Replies by EGVIA to the cPPP-related questionnaire issued in March 2017 by the European Commission
14. Minutes of the EGVIA General Assembly meeting, 4 February 2013
15. Minutes of the EGVIA General Assembly meeting, 6 March 2013
16. Minutes of the EGVIA General Assembly meeting, 17 November 2016
17. Minutes of the EGVIA General Assembly meeting, 4 May 2017
18. Minutes of the EGVIA Public Private Partnership Board meeting, 27 May 2014
19. Minutes of the EGVIA Public Private Partnership Board meeting, 16 January 2015
20. Minutes of the EGVIA Public Private Partnership Board meeting, 22 March 2016

Factories of the Future

1. Contractual arrangement setting up a Public Private Partnership in the area of Factories of the Future between the European Union and the European Factories of the Future Research Association (EFFRA), 17 December 2013
2. EFFRA roadmap: Factories of the Future 2020, 14 June 2013
3. Factories of the Future cPPP Progress Monitoring Reports 2014, 2015, 2016
4. Replies by EFFRA to the cPPP-related questionnaire issued in March 2017 by the European Commission
5. European Commission Factsheet: 'Factories of the Future PPP: towards competitive EU manufacturing', 2013
6. European Commission report of the Impact Workshop: 'Impact of the Factories of the Future PPP', held in Brussels on 14-15 April 2016
7. Summary Report and Operational Conclusions of the 11th Meeting of the Partnership Board for the Contractual Public-Private Partnership on Factories of the Future, 20 March 2017
8. Summary Report and Operational Conclusions of the 12th Meeting of the Partnership Board for the Contractual Public-Private Partnership on Factories of the Future, 15 May 2017

High Performance Computing

1. Contractual arrangement setting up a Public Private Partnership in the area of High Performance Computing between the European Union and ETP4HPC, 17 December 2013
2. Communication COM(2012) 45 from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 'High-Performance Computing: Europe's place in a Global Race', 15 February 2012
3. ETP4HPC Strategic Research Agendas 2013, 2015

4. High Performance Computing cPPP Progress Monitoring Reports 2014, 2015, 2016
5. ETP4HPC Activity Reports 2014, 2015, 2016
6. European Commission factsheet: 'High Performance Computing PPP: Mastering the next generation of computing technologies for innovative products and scientific discovery'
7. Replies by ETP4HPC to the cPPP-related questionnaire issued in March 2017 by the European Commission
8. Minutes of the HPC Public Private Partnership Board meeting, 13 June 2014
9. Minutes of the HPC Public Private Partnership Board meeting, 12 November 2014
10. Minutes of the HPC Public Private Partnership Board meeting, 23 April 2015
11. Minutes of the HPC Public Private Partnership Board meeting, 10 November 2015
12. Minutes of the HPC Public Private Partnership Board meeting, 11 May 2016
13. Minutes of the HPC Public Private Partnership Board meeting, 10 November 2016

Photonics

1. Contractual arrangement setting up a Public Private Partnership in the area of Photonics between the European Union and the Photonics 21 Association, 17 December 2013
2. Multiannual Strategic Roadmap 2014 – 2020: 'Towards 2020 – Photonics driving economic growth in Europe', April 2013
3. Photonics cPPP Progress Monitoring Reports 2014, 2015, 2016
4. European Commission factsheet: 'Photonics PPP: The next generation of photonics solutions to sustain Europe's industrial leadership', 2013
5. 'Jobs and Growth in Europe – Realizing the Potential of Photonics', PPP Impact Report 2017 published by the European Technology Platform Photonics21
6. Replies by the Photonics 21 Association to the cPPP-related questionnaire issued in March 2017 by the European Commission
7. Minutes of the Photonics Public Private Partnership Board meeting, 15 December 2014
8. Minutes of the Photonics Public Private Partnership Board meeting, 28 May 2015
9. Minutes of the Photonics Public Private Partnership Board meeting, 24 November 2015
10. Minutes of the Photonics Public Private Partnership Board meeting, 1 March 2016
11. Minutes of the Photonics Public Private Partnership Board meeting, 5 December 2016
12. Minutes of the Photonics Public Private Partnership Board meeting, 28 March 2017

Robotics

1. Contractual arrangement setting up a Public Private Partnership in the area of Robotics between the European Union and the Association euRobotics A.I.S.B.L, 17 December 2013
2. Robotics 2020 Multi-Annual Roadmap: For Robotics in Europe, Release B, 2 December 2016
3. Strategic Agenda for Robotics in Europe 2014-2020

4. Robotics cPPP Progress Monitoring Reports 2014, 2015, 2016
5. Replies by the Association euRobotics A.I.S.B.L to the cPPP-related questionnaire issued in March 2017 by the European Commission
6. European Robotics Forum 2016: Workshop Digest
7. European Robotics Forum 2017: Workshop Digest
8. European Robotics Week 2016 – handbook report
9. European Commission factsheet: 'Robotics PPP: The next generation of intelligent robots to keep EU manufacturing competitive', 2013
10. Minutes of the Robotics Public Private Partnership Board meeting, 17 November 2015
11. Minutes of the Robotics Public Private Partnership Board meeting, 13 May 2016
12. Minutes of the Robotics Public Private Partnership Board meeting, 8 November 2016
13. Minutes of the Robotics Public Private Partnership Board meeting, 8 March 2017

SPIRE

1. Contractual arrangement setting up a Public Private Partnership in the area of SPIRE between the European Union and the Association A.SPIRE A.I.S.B.L, 17 December 2013
2. SPIRE cPPP Progress Monitoring Reports 2014, 2015, 2016
3. Summary Report and Operational Conclusions of the 12th Meeting of the Partnership Board for the Contractual Public-Private Partnership on SPIRE, 23 November 2016
4. Summary Report and Operational Conclusions of the 12th Meeting of the Partnership Board for the Contractual Public-Private Partnership on SPIRE, 13 March 2017
5. Summary Report and Operational Conclusions of the 11th Meeting of the Partnership Board for the Contractual Public-Private Partnership on SPIRE, 29 May 2017
6. Replies by A.SPIRE to the cPPP-related questionnaire issued in March 2017 by the European Commission
7. European Commission factsheet: 'Sustainable Process Industry PPP: efficient and smart processes meeting the needs of tomorrow', 2013
8. 'Impact of the SPIRE Public Private Partnership' - Report of the Workshop held on 21st-22nd April 2016 in Brussels
9. Brochure on the SPIRE roadmap, July 2013

Annex 4. The Questionnaire sent by European Commission to the Associations/base for Associations' Interviews

Question 1: Which improvements at a project level or at other levels are necessary to further enhance and maximise the impact of projects in line with the overall objectives of Horizon 2020?

Question 2: What has been the impact of the cPPP and their roadmaps on national (and regional) research policies in the EU Member States? What is the impact of the cPPP on EU policies, especially those related to industry?

Question 3: What have been the leverage effects under the cPPP? The question refers to both the triggered private investment, and other relevant effects, such as subsequent closely related research and development activities within the remit of the cPPP.

Question 4: What interests are shared between the cPPP and other cPPPs and what overlaps and synergies – if any - can be observed? How is the situation in respect of this cPPP and other funding instruments?

Question 5: Did activities of the cPPPs lead to a disruptive market creation over the years and if yes in which markets? What activities have been undertaken to increase impact on the market beyond project level? (*to be answered to the extent possible*) Which steps should be taken to promote further innovation overall?

Question 6: Taking into account the current role of private for-profit entities in the innovative ecosystems of the cPPPs, how should private industries be considered in future Framework Programmes and what kind of financial support should they receive? There is a discussion whether industry should be funded and, if so, whether loans or other forms of assistance instead of grants are appropriate. What are your arguments in respect of this discussion? Please distinguish between large industry and SMEs in your replies.

Question 7: How do you see the future of cPPPs in the next Framework Programme?

Annex 5. List of the persons interviewed by the Expert Group

1. European Commission's officials interviewed on:

1.1. 18 May in Brussels:

- Factories of the Future: Erastos Filos, Unit D2 - Advanced Manufacturing Systems and Biotechnologies
- Energy-efficient Buildings: José Riesgo Villanueva, DG RTD, Unit D2 - Advanced Manufacturing Systems and Biotechnologies
- European Green Vehicles Initiative: Julija Sakovica and Frederic Sgarbi – DG RTD, Unit H2 - Surface transport
- Sustainable Process Industry: Nicolas Segebarth and Carmine Marzano, Unit D2 - Advanced Manufacturing Systems and Biotechnologies
- 5G Infrastructure: Bernard Barani and Eric Gaudillat - DG CONNECT, Unit E1 - Data Policy and Innovation Future Connectivity Systems
- Robotics: Anne Bajart, DG CONNECT, Unit A1. 1. Robotics and Artificial Intelligence, 001 - Robotics Industrial Development and Impact
- Photonics: Ronan Burgess and Anna Pelagotti - DG CONNECT, Unit A1 - Photonics
- Big Data Value: Kimmo Rossi, DG CONNECT, Unit G1 - Data Policy and Innovation (by phone)

1.2. 6 June 2017, Brussels

- High Performance Computing: Andrea Feltrin - DG CONNECT, Unit C2 - High Performance Computing and Quantum Technology, 001. Exascale Computing (by phone)

2. Industry representatives interviewed on 12 June 2017 in Brussels

- Big Data Value
 - Ana Garcia Robles, Big Data Value Association (BDVA)
 - Athanasios Poulakidas, Intrasoft
 - Alicia Garcia Medina, ATOS
 - Alexander Kröller, TomTom (by phone)
- Energy-efficient Buildings
 - Alain Zarli and Antoine Aslanides, European Construction Technology Platform (ECTP)
 - Donato Zangani, D'Appolonia SPA
 - Javier Bonilla Diaz, Acciona
 - Petra Colantonio, Fenix TNT SRO
- European Green Vehicles Initiative
 - Stephan Neugebauer, European Green Vehicles Initiative Association (EGVIA)
 - Marko Haeckel, Robert Bosch GMBH
 - Josef Affenzeller, AVL LIST GMBH
 - Neville Jackson, Ricardo UK LIMITED

- Factories of the Future
 - Zelko Pazin, European Factories of the Future Research Association (EFFRA)
 - Bernd Korves, Siemens
 - Giuseppe Sajeve, Engineering Ingegneria Informatica spa
 - Jacopo Cassina, Holonix
- High Performance Computing
 - Jean-Philippe Nominé, European Technology Platform for High Performance Computing (ETP4HPC)
 - Jean-Pierre Panziera, ETP4HPC and Atos-Bull
 - David Lecomber, Alinea Software Limited/ARM
 - Peter Bauer, European Centre for Medium-Range Weather Forecasts (ECMWF)
- Photonics
 - Markus Wilkens, Photonics21
 - Ronald Maandonks, Philips
 - Yasmine Eibinger-Pree, AMS (by phone)
 - Adam Potriowski, VIGO SYSTEM
- Robotics
 - Reinhard Lafrenz, euRobotics AISBL
 - Francesco Ferro, PAL Robotics
 - Bernd Liepert, KUKA
 - Rich Walker, Shadow Robots
- Sustainable Process Industry
 - Àngels Orduña Cao, Ignacio Martín and Klaus Peters, A. SPIRE
 - Hermann Josef Feise, BASF
 - Eros Faraci, Centro Sviluppo Materiali
 - Alejandro Rosales and Oonagh Mc Nerney, Innovacio I Recerca Industriali I Sostenible SL
- 5G Infrastructure
 - Jean-Pierre Bienaimé, 5GIA
 - Colin Willcock, Nokia (by phone)
 - Magnus Madfors, Ericsson

Annex 6. cPPP associations covered in this assessment

cPPP	Association	Association's website
5G Infrastructure	5G Infrastructure Association (5GIA)	https://5g-ppp.eu/
Big Data Value	Big Data Value Association (BDVA)	http://www.bdva.eu/
Energy-efficient Buildings	European Construction Technology Platform (ECTP)	http://www.ectp.org/
European Green Vehicles Initiative	European Green Vehicles Initiative Association (EGVIA)	http://www.egvi.eu/
Factories of the Future	European Factories of the Future Research Association (EFFRA)	www.effra.eu/
High Performance Computing	Association ETP4HPC	http://www.etp4hpc.eu/
Photonics:	Photonics21	http://www.photonics21.org/
Robotics	Association euRobotics A.I.S.B.L.	https://www.eu-robotics.net/
Sustainable Process Industry	A. SPIRE	https://www.spire2030.eu/

Getting in touch with the EU

IN PERSON

All over the European Union there are hundreds of Europe Direct Information Centres. You can find the address of the centre nearest you at: <http://europa.eu/contact>

ON THE PHONE OR BY E-MAIL

Europe Direct is a service that answers your questions about the European Union. You can contact this service

- by freephone: **00 800 6 7 8 9 10 11** (certain operators may charge for these calls),
- at the following standard number: **+32 22999696** or
- by electronic mail via: <http://europa.eu/contact>

Finding information about the EU

ONLINE

Information about the European Union in all the official languages of the EU is available on the Europa website at: <http://europa.eu>

EU PUBLICATIONS

You can download or order free and priced EU publications from EU Bookshop at: <http://bookshop.europa.eu>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see <http://europa.eu/contact>)

EU LAW AND RELATED DOCUMENTS

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex at: <http://eur-lex.europa.eu>

OPEN DATA FROM THE EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en/data>) provides access to datasets from the EU. Data can be downloaded and reused for free, both for commercial and non-commercial purposes.

Contractual Public Private Partnerships (cPPPs) are an important instrument under the current European Research and Innovation Programme, Horizon 2020.

Interested industry and the European Union work together in such a partnership built on a seven year strategic roadmap for each cPPP.

The EU contributes with EUR 7.1 billion whilst the industry is also committed to offer investments, work on new technologies and bring in other contributions.

To date, ten cPPPs are in place – some already dating back to 2008 (Factories of the Future, Energy-efficient buildings, European Green Vehicles) whilst others have been set up later when Horizon 2020 started in 2014 (Sustainable Process Industry, 5G Infrastructure, Robotics, Photonics, High Performance Computing and Big Data Value).

The contractual arrangements between the EU and industry last until 2020. These contractual arrangements foresee that a mid-term review by independent experts should be carried out in 2017.

This publication contains the mid-term review by a group of nine independent experts under the Chairmanship of Paolo Annunziato. The report contains six main recommendations on how to improve this instrument further in the short term and beyond 2020.

A cPPP on cybersecurity was launched only in 2016 and is therefore not part of the mid-term review.

Studies and reports

