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Scrutiny in Horizon 2020 focusing on the European Parliament's priorities

In-depth analysis for the ITRE Committee

EN

2016

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IN-DEPTH ANALYSIS

Abstract

This in-depth analysis provided by Policy Department A at the request of the ITRE committee, focuses on the European Parliament's key priorities for the Horizon 2020 programme. It assesses the extent to which the EP's key priorities have been implemented in the programme. It identifies measures, programmes and policy actions addressing these priorities, as well as bottlenecks in the implementation processes. It provides policy recommendations to improve the implementation of existing measures.

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LIST OF ABBREVIATIONS

APC	Author Processing Charges
EASME	Executive Agency for Small and Medium sized Enterprises
EEN	Enterprise Europe Network
EIT	European Institute of Technology
EP	European Parliament
ERA	European Research Area
ERC	European Research Council
ERCEA	European Research Council Executive Agency
ESIF	European Structural and Investment Funds
ESR	Evaluation Summary Report
FET	Future and Emerging Technologies
FTI	Fast Track to Innovation
ICT	Information and Communication Technologies
ITN	Innovative Training Networks
LEIT	Leadership in Enabling and Industrial Technologies
MSCA	Marie Skłodowska-Curie Actions
NCP	National Contact Point
OA	Open Access
ppp	Public-Private Partnerships
REA	Research Executive Agency
SEWP	Spreading Excellence and Widening Participation
SME	Small and Medium sized Enterprises
SwafS	Science with and for Society

EXECUTIVE SUMMARY

Background

The Industry, Research and Energy (ITRE) Committee of the European Parliament (EP) requested an in-depth analysis on the Horizon 2020 measures addressing the Parliament's priorities. The analysis feeds into a general debate on how the EU implements its research and innovation strategies to support economic growth and create jobs.

The adoption of the "Horizon 2020 package" was preceded by more than 6000 EP amendments, showing the great interest of the EP in the Horizon 2020 programme. The initial European Commission (EC) proposal included some of the EP's priorities. However, the EP required further clarification of these priorities, as well as specific targets, in order to guarantee the implementation of its priorities.

The objective of the note is to analyse how these EP's priorities have been implemented by the European Commission (EC) to date, to identify bottlenecks in the implementation, and to provide policy recommendations, based on the collected information and analysis.

Results

The EP's priorities for Horizon 2020 can be summarised as follows:

- Increase the participation of Small and Medium sized Enterprises (SMEs) in Horizon 2020, with a dedicated budget for the SME Instrument.
- Fast Track to Innovation scheme (FTI).
- Contribution of Horizon 2020 to the European Research Area (ERA) in terms of "researcher careers and researcher mobility".
- A guaranteed budget allocation for the 'Spreading Excellence and Widening Participation' (SEWP) and the 'Science with and for Society' (SwafS) programmes, as well as for e-infrastructure and for achieving EU climate and energy goals.
- 85 % of the "Energy Challenge" budget earmarked for non-fossil fuel energy research.
- Transparency and openness of Public-Private Partnerships (PPPs) and European Institute of Technology (EIT).
- Synergies between Future and Emerging Technologies (FET) and other parts of Horizon 2020.
- Open access (OA) to scientific publications and research data.
- Gender balance.
- Balance between small, medium and large projects.
- Synergies between Horizon 2020 and Cohesion Policy.

Based on the information assessed, it would seem that the above mentioned key EP priorities have been well addressed within the Horizon 2020 programme. However, we have identified some bottlenecks in the implementation of some instruments, programmes and policy actions, and there is a need to improve the implementation of these measures.

Recommendations

In a nutshell, support to SMEs has been more or less implemented across all priorities. Some improvements are necessary in the implementation of the SME Instrument. The FTI programme is highly appreciated by industry, and an increase in participation rates is expected in 2016. The European Research Council (ERC) and Marie Skłodowska-Curie Actions (MCSA) have contributed to ERA goals by providing long-term funding, thus attracting the best researchers in the world to the EU, and by providing career opportunities through researcher mobility. The budget lines allocated to SEWP and SwafS are appropriate. However, the impact of the funding in spreading excellence and widening

participation is questionable. More transparency in the implementation of PPPs and the EIT, as well as greater openness to new members, is recommended. Some synergies have been identified between the FET and other parts of the programme, but this could still be improved upon. The policy on OA to scientific publications and research data has been efficiently implemented, with only some problems in relation to author processing charges by hybrid journals. The Gender balance goal has not yet been fully achieved, but it has improved since FP7. A better balance between small, medium and large projects could be achieved by supporting more medium sized projects. There are several possibilities for synergy between Horizon 2020 and European Structural and Investment Funds (ESIF). However, further instructions on how to implement such synergies are needed.

1. CONTEXT AND METHODOLOGY

The European Parliament requested an in-depth analysis on the Horizon 2020 actions and measures addressing the Parliament's priorities. This analysis feeds into a general debate on how the EU implements its research and innovation strategies, in support of economic growth and job creation.

The adoption of the "Horizon 2020 package" was preceded by more than 6000 EP amendments, demonstrating the great interest of the EP in the Horizon 2020 programme. The initial European Commission (EC) proposal included some of the EP's priorities. However, the EP required further clarification, as well as specific targets, in order to guarantee the implementation of its priorities.

The objective is to analyse how priorities of the EP are implemented in Horizon 2020, to identify bottlenecks in the implementation, and to provide policy recommendations to the EP, based on the collected information and analysis.

The methodology is based on three phases: an initial desk research phase, which is then complemented by stakeholder interviews (National Contact Points (NCPs), EC officials) to collect information, and a final phase on conclusions and recommendations.

The second chapter of this note is focused on the implementation of EP priorities in Horizon 2020. Each section briefly explains the EP's priority, then assesses how the priority has been implemented. Finally, identified bottlenecks are presented. In the third chapter of this note, policy recommendations on better implementation of existing measures are provided.

2. SCRUTINY OF HORIZON 2020 PROGRAMME, FOCUSING ON THE EP'S PRIORITIES

2.1. Increase the participation of Small and Medium-sized Enterprises (SMEs) in Horizon 2020

2.1.1. EP priority

Horizon 2020 will encourage and support the participation of SMEs in an integrated way across all specific objectives. A dedicated SME instrument that is targeted at all types of SMEs with an innovation potential shall be created under a single centralised management system and implemented primarily in a bottom-up manner through a continuously open call tailored to the needs of SMEs. A minimum of 20 % of the total combined budgets for the specific objective Leadership in Enabling and Industrial Technologies (LEIT) in pillar 2 and the priority 'Societal Challenges' in pillar 3 will be allocated to SMEs. A minimum of 7 % of the total budgets of this specific objective and priority will be allocated to the dedicated SME instrument averaged over the duration of Horizon 2020.

2.1.2. Implementation across all priorities of Horizon 2020

The participation of SMEs is supported across all priorities of Horizon 2020. 'Industrial Leadership' and 'Societal Challenges' are more relevant for SME participation, as SMEs can participate in collaborative projects and apply for SME Instrument funding. In the 'Industrial Leadership' priority, actions aiming at providing better innovation support services to SMEs are funded, and financial facilities for SMEs are available.[1] In the 'Excellent Science' priority, SMEs can participate in 'Future and Emerging Technologies' (FET) 'OPEN' projects and MCSA. However, this priority remains of limited relevance for SMEs, as no budget target is foreseen for SME participation in these projects.

[1] https://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_sme_measures_in_horizon_2020.pdf

Compared with the situation under FP7, the share of SME participation has increased under Horizon 2020.[2] The financial contribution target of 20 % of LEIT and Societal Challenges funding going to SMEs has been achieved.

2.1.3. SME Instrument

i. Objectives

The SME Instrument aims at supporting close-to market activities of European SMEs, in order to help them grow and expand their activities within the EU and beyond. Highly innovative SMEs with a clear commercial ambition and a potential for high growth and internationalisation are the target of the instrument.

ii. Implementation

The SME Instrument has been implemented through three phases covering the needs of SMEs, from idea to market. Phase 1 deals with the concept and feasibility assessment, while Phase 2 addresses demonstration, market application and, where relevant, R&D activities. Phase 3 does not provide direct funding, but supports access to risk finance, and also includes a wide range of innovation support services.

The SME Instrument operates under a single centralised management system. It is managed by EASME and implemented on a bottom-up approach, via continuously open calls for proposals. There are four cut-off dates a year, which allow SMEs to flexibly plan when to submit, or even re-submit, a proposal. The administrative burden required to prepare an application seems to have been reduced, and varies according to the size of the proposal (10-page document for Phase 1 and 30-page document for Phase 2).

Communication relating to the SME Instrument is managed by EASME. It represents the SME Instrument at EC events, and manages the SME Instrument's web and social media presence. EASME's website is user-friendly and provides essential information on the SME Instrument, as well as links to frequently asked questions, to the Enterprise Europe Network (EEN) and to the NCPs.

The evaluation criteria for the SME Instrument are: Impact, Excellence, Quality and Efficiency of Implementation. The overall score is calculated based on the median score of four evaluators' scores for each criterion. The Impact criterion has a weighting of 1.5 for proposals above the threshold, in order to establish the ranking list. For each evaluation criterion, there is a sub-criterion on 'Overall Perception', with a weighting of 25 % of the total score for that criterion. After each cut-off date, the results are communicated to the applicants within six weeks. Time to grant for Phase 1 is three months, and six months for Phase 2 (in 90 % of all cases).

iii. Funding

To date, 5 % of both LEIT and Societal Challenges budget has been allocated to the SME Instrument. The overall budget assigned to the SME Instrument in 2014-2015 was EUR 500 million. For 2016-2017, the total allocated budget is nearly EUR 740 million, a 44.2 % year-on-year increase.

In Phase 1, a lump sum of EUR 50 000 is granted to every selected proposal. In Phase 2, grants range from EUR 0.5 million to EUR 2.5 million. The funding rate is 70 % of direct costs, with an additional lump sum of 25 % of the received direct costs granted to cover indirect costs.

An initiative called the "Seal of Excellence"[3] was launched by the EC in October 2015, allowing regions to recognise the quality level awarded to promising project proposals

[2] Horizon 2020. First results.

(projects with a score above a certain threshold) under Horizon 2020. These project proposals could then use this Seal to apply for alternative funding sources, such as ESIF and other national and regional funds. In its pilot phase, the Seal of Excellence will be given to good SME Instrument proposals that did not qualify for of SME Instrument funding.

iv. Strengths

Overall, the SME Instrument has supported the risky and expensive development stage of innovative solutions, as well as their eventual commercialisation. SMEs can apply as single entities; applications are limited to 10 (for Phase 1) or 30 (for Phase 2) pages. Phase 1 allows SMEs to carry out a feasibility study and set up a business plan, whilst Phase 2 allows SMEs to take their solution to TRL 9 ready to be commercialised. The SME Instrument's co-funding rate is 70 %, its approach is bottom-up and SMEs can propose any solution, within the topic they are addressing. Furthermore, the SME Instrument is a continuously open call with four cut-off dates a year.

v. Bottlenecks

The objectives of the instrument were not fully understood at the beginning. According to the first lessons learned[4], unsuccessful proposals were too project focussed, the innovation content and TRL was too low, and business perspective was too widely described. This was due to a lack of understanding of the SME Instrument's purpose and structure and lack of efficient communication on the Instrument's goals and target group.

Some communication and transparency problems. Some statistics on the results of the Instrument are made available on EASME's website, but there is not a detailed statistic. This might raise a question about full transparency. Communication to the NCP network about the Instrument's implementation and its results is unsatisfactory according to some NCPs.

Evaluation mechanism raises some scepticism. According to some interviewees, the Evaluation Summary Report (ESR) of the SME Instrument is not 'information rich'. SMEs do not find the information useful to analyse the weakness of their proposal. What is evaluated under the sub-criterion (which has a 25 % weighting) might not always be very clear. Sometimes the same proposal might get a different score when re-submitted, which signals an objectivity problem. The evaluation is undertaken without meeting the SMEs. This does not allow their specific profiles to be taken into consideration during the evaluation process.

The success rate is very low and many projects above the threshold (13 out of 15 for Phase 1, 12 out of 15 for Phase 2) cannot be funded. Due to high SME interest in the Instrument and a comparatively limited budget, success rates are very low (about 6 %). Furthermore, in 2014, 32 % of Phase 1 proposals and 57 % of the Phase 2 proposals above the threshold were not funded.[5] The 'Seal of Excellence' is a potential alternative. However, it is not clear how it will be implemented by the Member States and their regions. It is unlikely that the regions will be able to award the same amount of grants as the Instrument.

Lack of budget flexibility between topics reduces the number of funded projects. The Commission services decide the amount of funding to be allocated to each SME Instrument topic. When there is no application for a specific topic, this available budget cannot be transferred to another topic where there are many proposals with scores above the threshold. Furthermore, some topics are much more competitive than others. This is not considered in the budget breakdown per topic.

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3 http://europa.eu/rapid/press-release_IP-15-5801_en.htm

4 SME Instrument Evaluation results for the first three cut-off dates, EASME

5 Statistics provided by the EASME.

2.2. Fast track to innovation pilot

2.2.1. EP priority

To reduce the time from idea to market and to increase the participation of industry, SMEs and first-time applicants in Horizon 2020, the FTI Pilot should be implemented with 'time to grant' not exceeding six months within the specific objective LEIT and within the priority 'Societal challenges'. It should also stimulate private sector investment in research and innovation (R&I), promote R&I with a focus on value creation, and accelerate the development of technologies into innovative products, processes and services.[6]

2.2.2. Objectives

The FTI Pilot is the means of achieving this EP priority, and aims at promoting close-to-market innovation activities with a fully bottom-up approach. It gives the development of innovations the last push needed before their introduction to the market. Technology concerned must be at least at TRL 6.

By allowing collaboration between all types of innovation actors, without a thematic specification, the FTI Pilot is expected to reduce the time from idea to market, to attract new applicants to Horizon 2020, and to increase private sector investment in R&I. Time to grant under the FTI Pilot is six months, as required by the EP.

2.2.3. Implementation

The FTI Pilot was launched in 2015 and has been implemented in 2015 and 2016 across the Societal Challenges and LEIT programmes. The pilot is implemented by EASME through one common and continuously open call, with three cut-off dates per year. FTI emphasises project impact and industrial participation, particularly SME participation. The size of the budget allocated to industry participants (at least 60 % of the budget) and the number of industry participants (minimum 2 in a consortium of 3-4 partners, 3 in a consortium of 5 partners) are taken into account during the evaluation. The Work Programme also states that: "First-time industry applicants and SMEs are particularly welcome." 63 % of applicants during the first cut-off period were private entities, 46 % of which were SMEs. However, information on the percentages of industry, SMEs and first-time applicants within funded projects is not available. Interviewees state that FTI is highly appreciated by industry. Greater participation is expected in 2016. In particular, SMEs require more flexible tools.

2.2.4. Funding

The total budget of the FTI Pilot is EUR 200 million (EUR 100 million per year). EU funding is fixed at 70 % of eligible costs. The indicative EU contribution per action is expected to range between EUR 1 million and EUR 2 million; in duly justified cases, an EU contribution of up to EUR 3 million can be considered. For the first cut-off period, EASME received 269 proposals. 48 projects were above threshold, and 16 projects were selected, receiving EUR 35.571 million of funding. The second round received 229 proposals, involving 922 participants. 51 projects were above threshold. EUR 32.7 million of funding was awarded to 15 projects.[7] The overall annual budget is equally divided between each cut-off period. Each proposal is in competition with other proposals on differing topics, within a given cut-off period.

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[6] European Parliament legislative resolution of 21 November 2013 on the proposal for a regulation of the European Parliament and of the Council establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020) (COM(2011)0809 – C7-0466/2011 – 2011/0401(COD))

[7] https://ec.europa.eu/easme/en/news/eu-gives-327-million-bring-innovative-ideas-market-quicker

2.2.5. Strengths

The FTI Pilot brings several advantages to beneficiaries, such as high visibility, increased market access, establishment of new collaborations and value chains, as well as a fast and high rate of funding.

2.2.6. Bottlenecks

Over subscription and low success rates are the main problem. The competition for FTI funding is extremely high. For the first and second cut-off periods, the success rate was 6 % and 6.5 %. Several projects scoring above the threshold could not be funded.

Actual 'time to grant' may be more than six months. A common difficulty encountered was the preparation of a business plan. Setting up a business plan for a collaborative project may not be easy. It takes time and requires many discussions.

Evaluation mechanism and quality of feedback were slightly criticised. Evaluation reports seem satisfactory. According to interviewees, there is a good compromise between quality feedback and fast feedback, allowing applicants to understand what could be improved in their proposal. However, in some cases, the extent of the feedback was very different (in some cases, a good explanation was given; in others, just a few lines). No consensus meeting is organised during the evaluation of the proposals. When appropriate, a panel review can be organised remotely.[8] Moreover, some stakeholders stated that evaluators do not have enough time to properly evaluate proposals.

It is difficult to measure the extent to which private sector investment is stimulated and first-time applicants are attracted. It is not well-defined how FTI will stimulate private sector investment. Secondly, there is no eligibility rule stating that consortia must involve first time applicants. There is not a strong incentive to include first-time applicants, except that in the case of tied proposals priority will be given to the applications containing the higher number of first-time, private applicants.

2.3. Open access (OA) to scientific publications and research data

2.3.1. EP priority

To increase the circulation and exploitation of knowledge, open access to scientific publications should be ensured. Furthermore, open access to research data resulting from publicly funded research under Horizon 2020 should be promoted, taking into account constraints pertaining to privacy, national security and intellectual property rights.[9]

2.3.2. Objectives

The objective of OA to scientific publications is to provide online and free access to science through scientific publications. The objective of OA to research data is to maximise access to, and re-use of, research data generated by projects.

2.3.3. Implementation

Horizon 2020 requires beneficiaries to deposit all peer-reviewed publications resulting from funded projects in a scientific repository and to make them freely available. It is also recommended to provide OA to monographs, books and conference proceedings. OA complies with intellectual property rights. To ensure OA, there are two main options: (1) 'Green' Open Access or 'Open Access Archiving' and (2) 'Gold' Open Access or 'Open Access Publishing'. The EC does not prioritise one over the other. Green OA means that the

[8] Work Programme 2016-2017, 18. Fast track to innovation pilot.

[9] European Parliament legislative resolution of 21 November 2013 on the proposal for a regulation of the European Parliament and of the Council establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020) (COM(2011)0809 – C7-0466/2011 – 2011/0401(COD))

published article or the final peer-reviewed manuscript is archived by the author in an online repository. Self-archiving regulations differ between publishers. Authors have to check their publishing agreement to find out whether self-archiving is allowed. Several institutional or disciplinary repositories are available. OpenAIRE (OA Infrastructure for Research in Europe, funded under FP7 and Horizon 2020) is the recommended entry point to choose a suitable repository. Gold OA is publishing in an OA journal, which enables immediate free access to all articles at the moment of publication.

A strength of Gold OA is that it allows the publication to be made immediately accessible on the website of the journal, while for Green OA an embargo period can apply. For Gold OA, this advantage has a financial cost, which is called "author processing charges (APCs)". The APCs incurred during the duration of a project are eligible for reimbursement. It is recommended to foresee an approximate budget for these costs at the proposal submission stage. If it was not planned for, it is still possible to shift some funds to these costs.

A mechanism for post-grant support is being piloted via the OpenAIRE2020 project, to deal with OA publication charges incurred after the end of grant agreements with the EC. An upper limit of EUR 2 000 per article is expected.

The pilot for research data covers some parts of Horizon 2020, decided upon by the EC, after wide consultation. Some new areas[10] have been added to the Pilot Action in the Work Programme for 2016-2017.

The EC policy on open research will be further developed, based on the results of this Pilot Action. Projects in other areas not currently part of the Pilot can participate on a voluntary basis, which is called an 'opt in' option. Projects may also 'opt out' of the Pilot in a series of cases, at any stage, including IPR, data protection or national security reasons. Participants are required to deposit the research data into a research data repository, which can be subject-based/thematic, institutional or centralised. It is expected that OpenAIRE will allow for the linking of publications to underlying research data. As far as possible, participants must facilitate third party access to mine, exploit, reproduce and disseminate this research data. The EC recommends attaching a Creative Commons Licence to deposited data. Costs incurred by the implementation of the pilot are eligible for reimbursement.

Supporting measures have also been put in place within Horizon 2020: specific technical and professional support services will be provided, via the e-Infrastructures Work Programme.

What is also new in Horizon 2020 is the Data Management Plan requirement (DMP), which is obligatory for projects participating in the Open Research Data Pilot and optional for others. The DMP has to be prepared and submitted within six months of the project start. It is a flexible instrument for OA to research data, as it allows to specify whether any beneficiary cannot give OA to any data resulting from the project, and to explain the underlying reason for this. The DMP is not part of the evaluation procedure, but it does undergo a quality control check - as for other deliverables.

2.3.4. Bottlenecks

Some 'hybrid journals' might benefit from the complexity of the current system. There are several models adopted by publishers to provide OA to scientific publications. For the 'author-pay' model, full OA journals provide immediate OA in return for Article Processing Charges (APC). Some 'hybrid journals' offer both traditional publication and OA to specific articles within a traditional journal. They can in principle receive subscription as

[10] "Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology: 'nanosafety' and 'modelling' topics" and "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy.

well as APC income for the same article. This creates the suspicion that publishers may charge twice, which is called "double-dipping". Should this be true, it increases costs for funders, research organisations, universities, etc. This is highlighted in some reports[11], and some institutions[12] recommend against publishing in hybrid journals. This issue is being investigated by the EC.

Awareness about the OA requirements of HORIZON 2020 has not yet been fully achieved. Not all researchers participating in Horizon 2020 funded projects are aware of OA requirements. Some researchers only become aware of OA requirements at the final project reporting stage. However, it is expected that more researchers are aware of OA requirements under Horizon 2020 than under FP7, where OA to scientific publications was still a Pilot Action.

Proliferation of illegitimate open access journals[13] may be a problem. However, this is due to the author-pay model, not because the results of research are made freely available. It is also argued that reimbursement of fees by public funds may lead to fraud.[14]

As a result of OA to research data, problems such as misappropriation and commercialization of research data, unequal distribution of scientific results, etc., may occur. It is not yet clear how this will be addressed by the Pilot Action.

2.4. Contribution of Horizon 2020 to the European Research Area, in terms of "research careers and researcher mobility"

2.4.1. EP priority

To make use of human resources in the EU, specifically by encouraging the development of framework conditions to help European researchers to remain in or to return to Europe; to attract researchers from around the world and make Europe a more attractive destination for the best researchers.[15]

Based on the EP's priorities, the focus in this section is on the contribution of Horizon 2020 to research careers and mobility. Specific objectives of Horizon 2020 contributing to this axis are the European Research Council and the Marie Sklowdowska-Curie Actions, the EIT and to some extent the Research Infrastructures.

2.4.2. European Research Council (ERC)

i. Objectives

The ERC will provide appropriate levels of support for established researchers, and will share experience and best practice with regional and national research funding agencies, to support excellent researchers. In addition, the ERC will further raise the visibility of its programmes and ensure transparency in communication about its activities and results to the scientific community and the general public. It will also maintain updated data about funded projects.

ii. Implementation

Scientific excellence is the sole criterion on the basis of which ERC grants are awarded. Applications can be made in any field of research. Independent researchers of any age and

11 http://www.publications.parliament.uk/pa/cm201314/cmselect/cmbis/99/9902.htm
12 https://www-scd.univ-rennes1.fr/themes/scd/AO-OA/06-h2020-en/
13 http://www.theguardian.com/higher-education-network/blog/2013/oct/04/science-hoax-peer-review-open-access
14 http://www.theguardian.com/higher-education-network/blog/2013/oct/04/science-hoax-peer-review-open-access
15 European Parliament legislative resolution of 21 November 2013 on the proposal for a regulation of the European Parliament and of the Council establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020) (COM(2011)0809 – C7-0466/2011 – 2011/0401(COD))

career stage, based anywhere in the world, can apply for ERC grants. The ERC specific priority is implemented by the ERC Executive Agency. The evaluation of ERC grant applications is conducted by peer review panels composed of renowned scientists who are selected by the Council. ERC grants consist of: Starting, Consolidator, Advanced and Proof of Concept grants. Each grant type has specific eligibility conditions. Some restrictions on applications are applied, based on the outcome of the evaluation of previous calls.

The ERC contributes to the ERA's objectives, to some extent. The ERC 2014 Annual Report[16] states that "a quarter of the mobile successful applicants (or less than 3 % of all ERC grantees) come to the EU and the FP7 Associated Countries from a country outside the ERA. They are, however, mainly ERA nationals (72 %)." This statistic must also be monitored in Horizon 2020 call results to assess the extent to which the ERC attracts researchers from across the world.

In terms of communication, the ERC ensures transparency by regularly publishing information of use to applicants such as listing members of the Scientific Council, experts and funded projects, etc. The ERC website is user-friendly and provides essential information on application procedures and funded projects, as well as detailed statistics.

In terms of geographical coverage, ERC grants are concentrated in a relatively small number of EU regions: only 287 out of 1 462 NUTS 3[17] regions (less than 20 %) are home to an ERC Host Institution, and only 103 of those have managed to attract 10 or more ERC grantees.

In terms of mobility, the ERC also contributes to the ERA's objectives. In 2014, 10 % of successful ERC applicants became affiliated to a Host Institution in a country other than their country of residence at the time of application. The UK and Germany attract the largest number of foreign grantees. On the other hand, the largest absolute numbers of successful applicants moving out of their country of residence are those of the UK and Germany (more than 60 Principal Investigators in each case).

iii. Funding

EUR 13.1 billion is dedicated to the ERC within Horizon 2020, which represents around 17 % of the entire Horizon 2020 budget. The funding level remained the same in the first two Work Programmes. To date, about EUR 1.6 million has been allocated under each Work Programme (2014-2015 and 2016-2017). Grants of up to EUR 1.5 million for the Starting category, up to EUR 2 million for the Consolidator category and up to EUR 2.5 million for the Advanced research category are allocated, each for a 5-year period. Some interviewees state that frontier research funding is needed, and that scientists appreciate ERC funding. It provides attractive long-term funding, in order to be able to carry out high risk/high return projects.

iv. Bottlenecks

The high competition and low success rate (10-15 %) of the ERC have been criticized. Many young researchers have given up applying.[18] It is also argued that researchers from Eastern Europe have little to no chance of securing an ERC grant. Perversely, ERC grants are increasing inequality among researchers in the ERA by only providing generous funding to a small percentage of researchers. Moreover, for some stakeholders, the grants are so generous that the few ERC grant holders might abandon 'real' research and become mini-

[16] https://erc.europa.eu/sites/default/files/publication/files/erc_annual_report_2014.pdf
[17] The NUTS-3 level roughly corresponds to the OECD territorial level 3, which describes micro-regions, often coinciding with 'provinces'.
[18] http://www.theguardian.com/higher-education-network/2014/nov/07/european-research-funding-horizon-2020

funding managers. Each ERC grantee employs on average six team members.[19] No information is available as to whether or not the ERC shares experience and best practice with national funding agencies.

2.4.3. Marie Sklowdowska-Curie Actions (MSCA)

i. Objectives

Marie Skłodowska-Curie fellowships offer attractive career development opportunities in prestigious research teams in Europe, whatever the nationality or scientific domain of the researcher. Organisations from any sector and country can participate in the MSCA.

ii. Implementation

The MSCA are run by the Research Executive Agency under Horizon 2020, via several types of actions: Innovative Training Network (ITN), Individual Fellowships (IF), Research and Innovation Staff Exchange (RISE), Co-Funding of regional, national and international programmes (COFUND) and the European Researchers' Night - a specific outreach activity to communicate science to the general public, with special emphasis on pupils and students.

The main features of the MSCA are: Open to all domains of research and innovation from basic research to market take-up and innovation services; entirely bottom-up; participation of non-academic sector is strongly encouraged, especially industry and SMEs; mobility is the key requirement - funding on condition that participants move from one country to another; promotion of attractive working and employment conditions; particular attention to gender balance; EU contribution based on unit costs; calculated on the basis of researcher-months.

Mobility supported by the MSCA allows researchers to acquire new skills, improves scientific performance and technology transfer, and contributes to the creation of dynamic networks and the opening of the ERA. In particular, the MSCA are addressing ERA commitments by: (1) reinforcing innovative training by increasing the programme budget share for ITN (up from 40 % to 50 %), by increasing the transferable skills award criteria requirement, and by allowing doctoral programmes to now be supported within COFUND; (2) enabling cross-sectoral knowledge exchange in IF; (3) attracting new people to the research profession, via public outreach activities.

iii. Funding

EUR 6.1 billion is dedicated to the MSCA in Horizon 2020.

iv. Bottlenecks

No specific synergies are identified with the other parts of the Horizon 2020 programme.

2.5. Spreading Excellence and Widening Participation (SEWP)

2.5.1. EP priority

Parliament's negotiators ensured that around EUR 750 million from the Horizon 2020 budget will go to SEWP measures to help close the R&I divide in Europe and to unlock excellence in low performing R&I regions, thereby widening participation in Horizon 2020 and contributing to the ERA.

[19] https://erc.europa.eu/about-erc/facts-and-figures

2.5.2. Objectives

The objective of this pillar is to spread excellence to the low-performing Member States and Associated Countries in terms of research and excellence, thus widening the participation of these countries to Horizon 2020.

2.5.3. Implementation

The actions covered in SEWP necessitate specific geographical eligibility conditions. The actions target low performing countries in terms of research excellence. The Composite indicator of Research Excellence – with a corrective threshold of 70 % of the EU average - has been selected to distinguish those countries identified as "low R&I performing" or "Widening" countries.

Main actions funded under SEWP are:

- Teaming: supporting creation of new (or upgrading existing) Centres of Excellence in low R&I performing countries with internationally leading institutions.
- Twinning: strengthening a defined field of research in research organisation from a Widening country by linking it with two internationally leading research institutions.
- ERA Chairs: bringing outstanding researchers to universities and other research organisations, to help them attract and maintain high quality human resources and implement structural changes necessary to achieve excellence.

In some parts of Horizon 2020, special attention is given to the participation of and impact on low performing Member States and Associated Countries, i.e. the 'Valorisation of FP7 Health and HORIZON 2020 SC1 research results' topic of the 2016-2017 Work Programme.

2.5.4. Funding

EUR 816.5 million is dedicated to this in Horizon 2020 pillar.

2.5.5. Bottlenecks

Some interviewees stated that the measures have the potential to address the issues for which they were created. However, the dedicated budget does not seem not to be large enough to have a real impact. To spread excellence, it may be necessary to implement further actions. To enhance capacity, structural funds should be used. However, it is not clear for stakeholders how synergies between ESIF and Horizon 2020 could be implemented.

For Teaming actions, organisations spend a lot of time preparing proposals for the first stage of these actions. However, the success rate is very low. Return on investment is not encouraging.

2.6. Research infrastructure – e-infrastructure

2.6.1. EP priority

An appropriate proportion of the budget for research infrastructures should be devoted to e-infrastructure.

2.6.2. Objective

The e-infrastructure call will support the European policies on open research data, data and computing intensive science, research and education networking, high-performance computing and big data innovation.

2.6.3. Funding

There has been a decline in the e-infrastructure budget. EUR 175.5 million out of the EUR 581.61 million was allocated to the e-infrastructure in the 2014-2015 Research Infrastructure Work Programme, while for 2016-2017 Work Programme, this is EUR 122 million out of EUR 604.7 million.

2.6.4. Bottlenecks

No bottlenecks have been identified.

2.7. Future and emerging technologies

2.7.1. EP priority

Activities within the specific objective FET should be complementary to the activities within the other parts of Horizon 2020, and, where possible, synergies should be sought.

2.7.2. Implementation

In the FET Work Programme, proposals seeking synergies with other parts of Horizon 2020 are encouraged. For example, in the 'FETHPC-03-2017: Exascale HPC ecosystem development' call, proposed actions should also seek to **create** synergies with other HPC related activities under HORIZON 2020, in particular with LEIT/Advanced Computing, LEIT/Photonics, and ECSEL. No other synergy is mentioned in the Work Programme.

2.8. Balance between small and large projects

2.8.1. EP priority

There should be an appropriate balance between small and large projects within the priority 'Societal challenges' and the specific objective LEIT.

2.8.2. Implementation

1 051 projects had grants of up to EUR 5 million (small projects), 161 projects had grants of EUR 5-10 million (medium-size projects) and 73 projects had grants of more than EUR 10 million each (large projects) in Societal Challenges. In LEIT[20], 692 projects had grants of up to EUR 5 million, 151 projects had grants of EUR 5-10 million, whilst only 22 projects had grants of more than EUR 10 million.

2.8.3. Bottlenecks

No bottlenecks have been identified.

2.9. Synergies between Horizon 2020 and Cohesion Policy

2.9.1. EP priority

Both Horizon 2020 and the cohesion policy seek a more comprehensive alignment with the objectives of the Europe 2020 strategy. This approach calls for increased synergies between Horizon 2020 and the cohesion policy. Therefore, Horizon 2020 should also develop close interactions with the European Structural and Investment Funds (ESIF), which can specifically help to strengthen local, regional and national research and innovation capabilities, particularly in the context of smart specialisation strategies.

2.9.2. Implementation

There are three kind of possible synergies between Horizon 2020 and ESIF:

- One project can benefit from both Horizon 2020 and ESIF funds but for different actions of the project in a complementary way.

[20] Source: Author, extraction from Cordis, Projects & Results Service.

- ESIF can be used for upstream capacity building projects which will then allow beneficiaries to apply to Horizon 2020 schemes, with stronger backgrounds and better proposals. The results of Horizon 2020 projects can then be used for downstream, close-to-market projects, funded by ESIF.
- Funding from alternative sources including ESIF can be used for positively evaluated Horizon 2020 proposals which were not funded, due to insufficient call budgets, i.e. 'Seal of Excellence'.

2.9.3. Bottlenecks

No bottlenecks have been identified.

2.10. Public Private Partnership (PPP) – Contractual and institutionalised

2.10.1. EP priority

The PPPs shall be open, transparent and effective. They should also adequately represent SMEs as well as attract funding from industry.[21] Further, they should be open to new participants or members, and not function like closed clubs.

2.10.2. Objective

The overall objective of the PPPs is to drive sustainable economic growth in the EU, create more durable and better paid jobs, and to improve quality of life and the competiveness of Europe on the global market.[22]

2.10.3. Implementation

There are nine **contractual PPPs (cPPP)**: Factories of the Future (FoF), Energy-efficient buildings (EeB), European Green Vehicles Initiative (EGVI), Advanced 5G networks for the Future internet (5G), Sustainable Process Industry (SPIRE), Robotics (SPARC), Photonics, High Performance Computing and Big Data. There are seven **institutionalised PPPs** that are split into Joint Technology Initiatives (JTIs) (Innovative Medicines (IMI), Clean Sky, Fuel Cells and Hydrogen (FCH), Bio-based Industries (BBI), Shift2Rail) and two Joint Undertakings (JUs) (Single European Sky ATM Research (SESAR) and Electronic Components and Systems (ECSEL)).[23]

2.10.4. Funding

The cPPPs have a budget of EUR 6.2 billion (excluding Big Data) from Horizon 2020, with industry contributing around 50 % of this.[24] The cPPPs do not organise their own funding (whereas the JTIs do); funding is awarded by the Commission through 'open calls'.[25]

The JTIs receive EUR 6.4 billion from Horizon 2020 and EUR 9.8 billion from industry. For ECSEL, Member States have added an extra EUR 1.2 billion. SESAR received EUR 600 million from Horizon 2020 and EUR 1 billion from the private sector.[26]

Some interviewees stated that the most obvious benefits for both cPPPs and institutionalised PPPs are that both have leveraged investments, and that:

- They have managed to get EC project results closer to the market, so it has been further investigated by industry.
- New products have come to the market, to the benefit of society.

[21] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1291&from=EN
[22] http://europa.eu/rapid/press-release_MEMO-13-669_en.htm
[23] http://ec.europa.eu/research/industrial_technologies/pdf/infoday2015/plenary/plenary_Valles_ImplementationcPPP.pdf
[24] http://europa.eu/rapid/press-release_MEMO-13-1159_en.htm
[25] http://europa.eu/rapid/press-release_IP-13-1261_en.htm
[26] http://europa.eu/rapid/press-release_MEMO-13-669_en.htm

- It has helped increase sustainability in sectors i.e. energy use, CO_2e and waste reduction.

2.10.5. Bottlenecks

All PPPs have an official website, and some have published reports and PowerPoints available, which provides information on objectives, progress to date, key performance indicators, project participants and members, etc. The following is an investigation as to whether or not the EP's priorities formed part of the communicated information. Stakeholder comments have been included in this section.

i. Contractual PPPs

Transparency is not fully achieved through official websites; however, there are other documents available with comprehensive information. Both the Associations' and the EC's websites did not present much data on openness, SME inclusion etc. However, presentations and PDF documents produced by EC DG RTD were found, that presented good information for FoF, EeB, EGVI and SPIRE.[27,28]. A stakeholder comment was that cPPPs are very transparent in the sense that all information is available on the Associations' websites and the EC's websites (i.e. there are lists of people sitting on partnership boards etc.). The stakeholder also said that the PPP membership lists are updated regularly; however, they may not always indicate new members.

Openness seemed to be achieved. Guidance on how to become a member was available on almost all PPP websites, except for EGVI. However, there was no information about new members. In addition, some Associations, such as FoF and EeB, had membership fees whilst Photonics did not have fees. Fees could be a potential barrier to entry for SMEs. However, a stakeholder said that there is likely not to be a barrier to membership in cPPPs since the EC is putting great pressure on them to drive up membership. Another stakeholder highlighted the difference between being a member and being a participant. Participation in projects (through Calls) is open to all. In general, around 25 % of project participants are Association members, whilst the remaining 75 % are non-members.

The range of stakeholders was poorly presented in most cases. Few websites communicated stakeholder information or had links to external websites where further information could be found. FoF, EeB, EGVI and SPIRE were all covered by the one presentation by EC DG RTD (as above). Photonics had some data available on the website.

Limited information available about SMEs. However, according to a stakeholder, the participation rate of SMEs in cPPPs has improved since FP7 (from 30 % to 34 %). Compared with institutionalised PPPs, cPPPs are more accessible to SMEs.

ii. Institutionalised PPPs

There is a lot of information available for most PPPs. However, SESAR, ECSEL and Shift2Rail could communicate more information. A stakeholder mentioned that grant data on the EC's main R&D website (Cordis) was still missing for some JTIs at the end of 2015.

Not enough evidence on openness. Most PPPs have detailed guidance on how to join, but the number of new entrants is rarely mentioned. Clean Sky has a good amount of information. SESAR had no such information. One stakeholder said that JTIs are often viewed as closed clubs, which are difficult for new organisations to join. Another said that, in theory, anyone can participate in projects. A third stakeholder highlighted that SME

27 http://ec.europa.eu/research/industrial_technologies/pdf/infoday2015/plenary/plenary_Valles_ImplementationcPPP.pdf

28 https://ec.europa.eu/research/industrial_technologies/pdf/contractual-ppps-in-horizon2020_en.pdf

inclusion rates were higher for cPPPs than for institutionalised PPPs, with one reason for this being that JTI subjects were less interesting to SMEs.

Overall sufficient evidence was available. Most institutionalised PPPs communicate how many stakeholders they have. However, they do not indicate how membership has changed over the years. SESAR only mentions that they have 17 members, which together represent 70 organisations[29], but does not indicate organisation type or when they joined. ECSEL and Shift2Rail have limited information, except about their founding members. The application process for projects is competitive, a costly process for applicants, and it takes time before they receive funding – which may be seen as a bottleneck, according to one stakeholder.

Overall, limited information available about SME inclusion. Only four out of seven PPPs communicated SME inclusion rates, namely: IMI, Clean Sky, FCH and BBI. FCH also mentioned the share of SMEs since FP7[30] and Clean Sky presented the percentage of funding directed to SMEs.[31] SESAR, ECSEL and Shift2Rail had insufficient information available on this. A stakeholder commented that ECSEL was moving towards larger-scale 'lighthouse' projects, which may result in reducing SMEs participation.

2.11. Gender balance

2.11.1. EP priority

Horizon 2020 should promote gender equality, especially in research and innovation.

2.11.2. Objectives

The objective of the policy is to foster gender balance in research teams, to ensure gender balance when making decisions, and to integrate analysis of gender/sex in the content of research and innovation.[32]

2.11.3. Implementation

Horizon 2020 has both regulations and rules of participation regarding gender balance and gender research. The Work Programme 'Science with and for Society' (SwafS) continuously funds institutional changes for gender equality in research institutions and universities. In 2014, Horizon 2020 also supported a communication campaign called "Science - it's a girl thing" to motivate females to study science. Gender equality is now one of the criteria for receiving Horizon 2020 funding.[33] This was highlighted by a stakeholder. The EC has set out to monitor the implementation of gender equality within Horizon 2020. Some data has been collected in 2014 and in 2015, with additional data to be collected in 2016.[34]

For 2015, filed gender aspect reports were measured in terms of inclusion of a gender dimension aspect. Reports made in the 'Socio-economic sciences & Humanities' area had a 50 % coverage, whilst reports from the 'Space' area only had a 1 % coverage.[35]

The first results of Horizon 2020 are available and show that the gender balance of expert evaluators was 35.7 % females and 64.3 % male. This has not yet reached the target of 40 % female participation, but it has improved since FP7 when it was 33.8 %.[36] A stakeholder said that, in strategy planning between the EC and the PPP Associations, there

29 http://www.sesarju.eu/discover-sesar/partnering-smarter-aviation
30 http://ec.europa.eu/research/press/jti/factsheet_fch2-web.pdf
31 http://ec.europa.eu/research/press/jti/factsheet_cs2-web.pdf
32 http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/gender/h2020-hi-guide-gender_en.pdf
33 https://www.elsevier.com/connect/gender-summit-will-explore-europes-new-plan-for-gender-equity-in-science
34 http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/gender/h2020-hi-guide-gender_en.pdf
35 http://www.lnvh.nl/files/downloads/346.pdf
36 https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/horizon_2020_first_results.pdf

was an emphasis on avoiding gender discrimination. An example of this was a project involving human and robot interaction, where both gender and age issues were included.

2.11.4. Funding

There is no direct funding for gender equality. Instead, it is indirectly funded through (for example) the Work Programme 'SwafS'.[37]

2.11.5. Bottlenecks

There is a lack of data on the results to date on gender equality, which can be explained by the fact that the monitoring process has not yet started, or has only recently started. This could also be a consequence of this aspect not being prioritised.

2.12. European Institute of Innovation and Technology (EIT)

2.12.1. EP priorities

To foster entrepreneurship, be open to new members, promote inclusion of SMEs and be transparent.[38]

2.12.2. Objectives

The EIT was created in 2008 with a mission to improve sustainable growth and competitiveness in Europe, as well as to strengthen the EU Members States' innovation capacity, and to educate students in entrepreneurship.

2.12.3. Implementation

One important activity within the EIT are the Knowledge and Innovation Communities (KICs), through which the EIT tests and develops innovations in collaboration with communities and organisations. As part of Horizon 2020, the EIT will develop new KICs. In 2010 there were three in place: Climate KIC, KIC InnoEnergy and EIT DIGITAL. In 2014, EIT Health and EIT Raw Materials were started. In 2016, Added-Value Manufacturing and Food4Future will start. In 2018, the Urban Mobility KIC will start.[39]

By November 2015, the EIT community had more than 800 leading partners, 900 business ideas, 181 innovative start-ups, 478 knowledge transfers and adoptions, 142 new products and services, as well as 486 graduates who had completed an EIT degree.[40]

2.12.4. Bottlenecks

Transparency could be improved regarding the EP's priorities. It is easy to find relevant information (key performance indicators) on the EIT website, although information relating to the EP's priorities is limited. A stakeholder noted that the EIT engages with stakeholders and citizens across the EU and beyond, for example through the EIT website and social media, through EIT conferences (open to all EIT stakeholders) and EIT Awareness Days, as well as through the EIT Regional Innovation Scheme (RIS). In addition, each of the EIT's five KICs have their own communication channels and specific tools that help ensure that their project activities and project results are widely disseminated to stakeholders and EU citizens. One bottleneck that needs to be improved upon is limited staff resources.

Participation in the EIT is open but not straightforward. It seems that it is not possible to simply join the EIT at any time. There is limited information on how to

[37] http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/gender/h2020-hi-guide-gender_en.pdf
[38] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R1291
[39] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/european-institute-innovation-and-technology-eit
[40] http://eit.europa.eu/eit-community-at-a-glance#slide_1368

participate. It is possible to 'call for' a KIC, if the call deadline has not passed.[41] However, there is no guidance available on how to join the EIT. According to one stakeholder, the EIT's statistics demonstrate openness. In six years, the number of KIC partners has increased from 73 to 800 (NB: during that same period, the number of KICs has increased from three to five). This stakeholder also noted that it was possible to participate in EIT and KIC activity, such as educational courses (MScs, PhDs and professional education), business creation and acceleration projects, as well as innovation projects.

It has a wide range of stakeholders. The number and range of stakeholders has been measured at 470 companies (including SMEs), 159 higher education institutions, 114 research organisations, 72 cities/regions/NGOs.[42] However, there is no distinction between existing and new members.

The level of SME inclusion is not publically available. There is no publically available, detailed information about the number of SMEs that are part of the EIT/KICs on the official EIT website or on the KICs' websites.[43] However, a stakeholder explained that the EIT is actively working towards SME inclusion. More than a quarter of the partners of the first three KICs (EIT Digital, Climate-KIC and KIC InnoEnergy) are SMEs. In addition, many more SMEs participate in the KICs through sub-contracting or through sub-grants arrangements with other KIC Partners (e.g. universities, research centres or companies).

The attractiveness of KICs to SMEs could be impacted by current levels of pre-financing. The EIT advocate providing SMEs with pre-financing of up to 70 % of the total grant awarded in order to help SMEs with cash flow concerns. The current limit is 50 - 55 % of the total grant awarded, which is often insufficient to SMEs and may stop them participate in the KICs. The setting of this limit is outside of the EIT's remit.

2.12.5. Funding

The EIT will receive funding of EUR 2.7 billion between 2014 and 2020.[44] One of the aims of Horizon 2020 is to attract private investment. In 2015, the ratio of project funding was 25 % from the EIT (public sector) and 75 % from KICs partnerships (private sector).[45]

2.13. Science with and for Society (SwafS)

2.13.1. EP priority

The EP's negotiators also ensured that over EUR 400 million will go to SwafS, measures strengthening science's role in society.

2.13.2. Objective

SwafS aims to create effective cooperation between society and science, to recruit talented people to science, and to make the public aware of scientific findings.[46] A particular aim is to attract young people to science and to increase society's interest in innovation.

2.13.3. Implementation

In the funding process, calls for proposals have focused on the following[47]:

- Making science education and careers attractive for young people (SEAC).
- Promoting gender equality in research and innovation (GERI).

41 http://eit.europa.eu/collaborate/2016-call-for-kics
42 http://eit.europa.eu/eit-community-at-a-glance#slide_1372
43 http://eit.europa.eu/eit-community-at-a-glance#slide_1372
44 https://ec.europa.eu/programmes/horizon2020/en/h2020-section/european-institute-innovation-and-technology-eit
45 http://eit.europa.eu/eit-community-at-a-glance#slide_1374
46 https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society
47 https://ec.europa.eu/research/swafs/index.cfm?pg=funding

- Integrating society in science and innovation (ISSI).
- Developing governance for the advancement of responsible research and innovation (GARRI).

As mentioned above, both gender equality activities and making science attractive to young people (especially females), has been funded by this Work Programme.

On the CORDIS website, there were 185 hits when searching for the term 'SWAF'.[48] A quick skim through these hits reveals that many projects at least mention that they wish to bring researchers together with civil society. One such example is the project 'Public Engagement with Research and Research Engagement with Society' which created a portal that hosts debates around different scientific topics[49] and which organised scenario workshops that NGOs could participate in.

2.13.4. Funding

SwafS will receive EUR 462 million in funding from Horizon 2020 (2014-2020).[50]

2.13.5. Bottlenecks

There is not much data available on results to date, as projects are still ongoing.

2.14. Help to achieve EU climate and energy goals

2.14.1. EP priority

The European Parliament has earmarked 85 % of the total Horizon 2020 'Energy Challenge' budget to target non-fossil fuel research, to support the EU climate goals[51].

2.14.2. Objectives

The 'Energy Challenge' (Secure, Clean and Efficient Energy) has as objective to "support the transition to a reliable, sustainable and competitive energy system"[52]. The 'Climate Action, Environment, Resource Efficiency and Raw Materials' Challenge has as objective to "help increase European competitiveness, raw materials security and improve well-being. At the same time, they will assure environmental integrity, resilience and sustainability, with the aim of keeping average global warming below 2° C and enabling ecosystems and society to adapt to climate change and other environmental changes"[53].

2.14.3. Implementation and funding

An environmental angle is evident across the entire Horizon 2020 programme, although for some areas, it is more directly evident. Within Horizon 2020's 'Societal Challenges', there are two specific objectives that support the EU's climate and energy goals. Namely, the 'Energy Challenge' and the 'Climate Action, Environment, Resource Efficiency and Raw Materials' Challenge. The 'Excellent Science' Pillar also has funding to support this action.

Societal challenges: The Energy Challenge has been allocated EUR 5.9 billion of funding, whilst the 'Climate Action, Environment, Resource Efficiency and Raw Materials Challenge

48 http://cordis.europa.eu/projects/result_fr?q=contenttype%3D%27project%27%20AND%20%27Swaf%27
49 http://cordis.europa.eu/result/rcn/148880_en.html
50 http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/applying-for-funding/find-a-call/h2020-structure-and-budget_en.htm
51 http://www.europarl.europa.eu/news/en/news-room/20131115IPR24730/Horizon-2020-research-programme-more-support-for-small-firms-and-new-players
52 https://ec.europa.eu/programmes/horizon2020/en/h2020-section/secure-clean-and-efficient-energy
53 https://ec.europa.eu/programmes/horizon2020/en/h2020-section/climate-action-environment-resource-efficiency-and-raw-materials

has been allocated EUR 3.1 billion, each for the entire duration of the Horizon 2020 programme.[54]

Besides, 85 % of the "Energy Challenge" budget was allocated to non-fossil fuel energy research. Of this 85 %, 15 % has been allocated to safeguard and continue the activities previously carried out under the IEE (Intelligent Energy Europe) Programme that ended in 2013.

Excellent Science: Horizon 2020 provides EUR 2.5 billion of funding towards the development of a European 'World-class research infrastructure'. This includes the purchase of equipment to help European researchers observe climate change.

2.14.4. Bottlenecks

There are no specific goals available for this priority on a micro level, only on a macro level (i.e. EU Environmental goals). Accordingly, it may be difficult to measure environmental improvements within each separate Horizon 2020 pillar and call.

[54] https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/H2020_inBrief_EN_FinalBAT.pdf

3. CONCLUSIONS AND RECOMMENDATIONS

It is fair to say that key EP priorities are well addressed in Horizon 2020. Some bottlenecks in the implementation of some instruments and policy actions have been identified and presented in the preceding chapter. Based on analysis of these bottlenecks, specific recommendations for improvements in the implementation of existing measures for each EP priority are provided below. These recommendations are addressed to the European Commission, to the Member States and to private sector participants in the various PPPs.

Increase the participation rate of SMEs in Horizon 2020 and the SME instrument

- There should be more targeted and efficient communication about the SME instrument, directed at SMEs, national administration, NCPs, etc. This could also allow reducing the number of proposals received.
- Transparency about the results should be ensured.
- The evaluation procedure should be improved. Should the number of proposals be reduced, additional feedback might be provided to SMEs on the evaluation outcome.
- Restrictions on resubmissions of proposals should be applied to reduce the number of proposals and increase the success rate - e.g. SMEs with proposals scoring under 9 would not be allowed to resubmit during the subsequent 3 cut-off periods.
- A brief explanation regarding the sub-criterion that accounts for 25 % of the evaluation should be given to SMEs, so that they can understand the relative weaknesses of their proposals.
- For Phase 2 projects, the evaluation should take into better account the profile of the candidate(s) through interviews. EASME is currently considering this.
- SMEs need more bottom-up instruments. Therefore, a fully bottom-up scheme like FTI should be considered. If not possible, full budget management responsibility should be given to EASME to allow budget transfers between topics.
- Sufficient flexibility should be given to the Member States in the implementation and use of the 'Seal of Excellence'.
- The MSCA should continue funding calls and activities designed to increase the participation rates of non-academic partners, including SMEs.

Fast Track to Innovation

- The scheme seems to function well and is appreciated by industry. It should be continued beyond 2016 to allow for sufficient results data, so that an in-depth analysis on the impact and effectiveness of the scheme can be conducted.
- The objectives of the instrument and the type of projects expected should be better communicated, to attract appropriate proposals and to increase the success rate.
- More information should be communicated regarding successful projects (number of industry partners, of SMEs, budget allocated to industry and SMEs, etc.).
- The proposal template for the FTI scheme could be improved in order to adapt it to the collaborative and close-to market nature of FTI projects.
- In order to standardise feedback, EASME could give some additional instruction to the evaluators, e.g. give feedback of at least three lines.
- At a minimum, a remote consensus meeting for project evaluators should be organised and more appropriate duration for project evaluation should be ensured.

- The amount of funding granted per project could be more flexible.
- To attract first-time applicants, consortia should be obliged to include at least one.

Open access to scientific publications and research data

- Taking account of the 'double-dipping' issue, policy requirements at implementation level should be modified if deemed necessary (e.g. APC incurred by publishing articles in hybrid journals may be made ineligible for reimbursement).
- To ensure the long term preservation of published articles, project participants should be strongly encouraged to deposit their articles in a repository, at the latest upon publication (even in cases of Gold OA publishing).
- More awareness raising and efficient communication actions are necessary, in order to promote open access among researchers.
- Monitoring of some indicators, such as the compliance rate with OA requirements, is needed in order to adapt the policy action in the future. This is already foreseen by the EC. It should be done systematically, for the duration of Horizon 2020.
- Some actions to motivate researchers to make their publications freely accessible could be envisaged. However, it requires Member State level implementation.
- New approaches to the organisation of peer review are expected to become prevalent in the near future. It may be necessary to adapt the OA policy and its obligations to take account of the evolution of the peer review system.
- Specific attention should be paid to 'predatory journals' and to the quality of scientific publications and their peer review systems.
- It will be necessary to monitor the results of the OA pilot, to adapt policy and to assess the feasibility of making OA to research data compulsory in coming years. Differences in scientific disciplines should be taken into consideration, and there should be some incentives used to promote the implementation of the policy.

ERA and specific objectives contributing to ERA

- The ERC scheme is well implemented. However, its contribution to the achievement of the ERA objectives could be better monitored and assessed.
- Whether or not investigators coming from outside the ERA remain in the ERA following their ERC grants should be monitored, to assess the return on investment.
- Synergies with structural funds should be sought to enhance the capacity of institutions from Eastern and Central Europe to train and attract the best researchers. The ERC Working Group should continue its efforts on this issue.
- The ERC should share experience and best practice with national funding agencies if not already done. Should it be shared, there should be communication about it.
- Information about MSCA opportunities should be provided through thematic events organised by the European Commission, by the Member States, and by the Member State regions.
- Career development of researchers following their mobility under the MSCA should be monitored in order to assess to what extent MSCA is contributing to ERA objectives.

Spreading excellence and widening participation

- The number of beneficiaries having participated in other projects funded by Horizon 2020, after benefitting from SEWP measures, should be monitored.
- Some specific information days on how to implement synergies between Horizon 2020 and the structural funds should be organised. This could be organised by the European Commission, in cooperation with Member States participating in SEWP actions, and in particular with SWEP NCPs and ESIF contact points.

Future and emerging technologies

- Further synergies with other parts of Horizon 2020, in particular LEITs, should be sought in the coming Work Programmes.

Balance between small and large projects

- The share of medium-sized projects could be increased, to have a better balance.

Synergies between Horizon 2020 and ESIF

- Training sessions for NCPs and ESIF contact points should be organised by the relevant European Commission Directorates-General. Beneficiaries could thus receive appropriate information on how to combine Horizon 2020 and ESIF funding for their projects, and synergies noted above could be achieved.

Public-Private Partnerships

- Institutionalised PPPs have made more information available than cPPPs have. However, all PPPs must communicate better the number and type of their members/ stakeholders, SMEs and new members, and indicate annual trends. It would be relevant to present progress on objectives/achievements to date in a user-friendly way to improve transparency and demonstrate openness.
- When updating their membership lists, PPPs should mention new members.
- Participation rate of SMEs in PPPs should be specified and standardised – rates are defined differently, depending upon the PPP. Some PPPs report SME participation as the rate of SME participation in open calls, whereas others report the percentage of their members or partners that are SMEs.
- Grant data for all JTIs should be made available on the EC's CORDIS website.
- The perception that JTIs function as closed clubs should be addressed.

Gender balance

- When presenting results, improvements from previous years should be included.
- In some cases, it says "participation of women" and in others it says "participation of under-represented sex". Maybe the latter term is more appropriate.

European Institute of Technology (EIT)

- More communication about the KICs, their objectives and operating mechanisms should be provided, in order to attract more participants, especially SMEs.
- More information is needed (for transparency purposes) on how many SMEs are participating, as well as similar information regarding the EP's priorities.
- More information is needed on annual trends for each KIC/theme, and not just on current membership levels (e.g. Has one type of stakeholder increased in number more than another during the previous year?).

- Better guidance is needed on the webpage on how to join EIT and the KICs.
- Pre-financing payment terms could be adapted, in order to better facilitate SME inclusion in the work of the EIT/KICs (i.e. change pre-financing payment terms from 50-55 % of total grant amount to 70 % of total grant amount). The attractiveness of KICs to SMEs could be improved in this way.

Science with and for Society

- Better communication is needed of results/progress to the public and stakeholders.

Achieving EU climate goals

- More specific environmental goals that are directly tied to overall goals should be considered. How much each Horizon 2020 pillar/call must achieve should be defined. Pillars/calls that achieve the most funding for environmental issues should be required to have, at least, specific, measurable goals in the Horizon 2020 timeframe.

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ANNEX 1: LIST OF INDIVIDUALS CONSULTED

In total, we have contacted 21 individuals. 11 of them agreed to answer our questions. The table below provides the name and the position of these individuals.

Name	Position
Bernd REICHERT	Head of Unit A2 "Horizon 2020 SMEs", EASME
Christian Dubarry	NCP for SMEs, Access to Finance - France
Marlis Erichsen	NCP for SMEs, Access to Finance – Denmark (interview on SME Instrument and Fast Track to Innovation)
Antonio Carbone	NCP for Fast Track to Innovation – Italy
Daniel Spichtinger	Data, Open Access and Foresight Unit Policy Officer - European Commission
Alex Berry	NCP for ERC - United Kingdom
Hannele Lahtinen	NCP for ERC – Finland
Mirjana Vuk	NCP Spreading excellence and widening participation - Croatia
Martin Kern	Interim Director - European Institute of Innovation & Technology (EIT)
Andrea Gentili	Deputy Head of the Unit D2 "Advanced Manufacturing Systems and Biotechnologies" of the Directorate "Key Enabling Technologies" - European Commission
Anonymised	NCP for Institutionalised PPPs – Member State

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CAT: QA-02-16-203-EN-N (pdf)

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