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DRAFT REPORT

on the assessment of Horizon 2020 implementation in view of its interim evaluation and the Framework Programme 9 proposal (2016/2147(INI))

Committee on Industry, Research and Energy

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CONTENTS

	Page
EXPLANATORY STATEMENT - SUMMARY OF FACTS AND FINDINGS.....	3
MOTION FOR A EUROPEAN PARLIAMENT RESOLUTION	8
ANNEX.....	16

EXPLANATORY STATEMENT - SUMMARY OF FACTS AND FINDINGS

1. Procedure and Sources

1.1 Aims and timing of the report

On 24 May 2016, the Rapporteur was entrusted with the task of preparing a report on the implementation of the Horizon 2020 Research FP (H2020).

The timing of the adoption by the EP of its implementation report was aligned with the timetable of the Commission who will adopt its Communication in October 2017 and its proposal for FP9 in spring 2018, to ensure the transmission of the EP's input for the interim evaluation of H2020 and the recommendations for the next research FP.

1.2. Sources and methods

The elaboration of this report took the analytical work done by the ITRE H2020 Working Group in place since 2015, which has held over 18 meetings with experts, stakeholders and the Commission and has elaborated a working paper on H2020. The EP monitors the implementing measures of H2020 and receives by DG RTD information dispersed to the Research Working Party of the Council. Answers to written questions to the Commission were a source of information, too.

The EPRS launched a European Implementation Assessment Study and has also published several other briefings and the Policy Departments within DG IPOL of the EP have commissioned several studies.

Two fact-finding missions were organised, to Portugal and Spain in November 2016 and to Germany and Poland in February 2017 and a Public Hearing on 'What future for EU-Research policy: taking stock and looking ahead' was organised in 29 November 2016.

The rapporteur has organised meetings with stakeholders and received many position papers from them. Official Commission reports and Communications were also valuable information sources.

Paragraph 2, 3 and 4 are in the Annex.

5. Vision of the rapporteur

H2020 is the biggest research programme in the world. Its aim of responding to societal and economic challenges provides us with a starting point for this assessment in acknowledging its success, and examining those aspects that need to be improved so its ambitious goals can be achieved efficiently and sustainably, and difficulties in implementation arising from its complexity overcome.

Horizon 2020 has its origins within the framework of the Europe 2020 goals – which prioritise innovation, enhanced competitiveness, greater SME involvement, and excellence – and was shaped in particular by the economic crisis and de-industrialisation in Europe. H2020's three pillar structure, simplification, open science, the introduction of new challenges, the search for synergies between EU funds and widening participation to improve R&D ratios in the regions falling behind most, and gender mainstreaming, these all constitute new lines or ones that have been further strengthened as compared to the FP7, plus the approximate 30 % budget increase.

However, the deep and rapid changes facing European society (nationalist populism, xenophobia, international terrorism, inequalities, migration flows, technological progress, social and healthcare challenges, climate change or sustainability of natural resources) call for a new paradigm requiring answers from society's perspective and in its interest, while preserving the values and principles that characterise the EU.

Europe is unparalleled as the region in the world where the high level of economic and social development, laws, freedoms and well-being all combine to give it the added value they confer on its identity. These must be preserved in this new context and must understand that R&D is key to addressing it. Science must be understood in order to have a knowledge society at the service of its citizens and in their interests, a sustainable and inclusive society, where the scientific community and industry are means through which to achieve the ultimate aim of science that is by and for society.

H2020 has thus constituted a reaction to the changing world and the next FP9 should continue to follow this line. However, all EU stakeholders need to boost their commitment to R&D.

In 2015, the EU invested 2.03 % of GDP in R&D (2.04 % in 2014 and 1.74 % in 2005, with investment by individual countries ranging from 0.48 % to 3.26 %). This is far from the Europe 2020 Strategy's 3 % target, which only Finland (3.2 %), Sweden (3.2 %), Denmark (3.1 %) and Austria (3 %) achieved, closely followed by Germany (2.9 %), and well behind South Korea (4.3 %), Israel (4.1 %) and Japan (3.6 %).

These figures make clear the competition facing the EU and the disparities in Member States' investment in R&D. These must be reduced, not just so that the EU hits the 3 % target by 2020, but also so it can reach a higher figure enabling it to improve its global competitiveness and set its sights on 4 % in a not too distant future.

What is required to tackle the gaps between regions, in addition to budget, is highly qualified human capital, technological infrastructure and university-business collaboration. The more innovative countries have a well-balanced national R&D system involving top quality academic research that is open to collaboration and top quality human capital, with a framework for R&D funding and risk capital so that enterprises develop new technologies. There is also a high level of business-sector investment in innovation, and of collaboration and innovation networks between companies and the public sector.

Key to all this is progress on the European Research Area, on working towards a 3 % of GDP budget target for R&D in all Member States, on enhanced widening or synergies between EU funds and the FP (simplification, rule compatibility, RIS alignment and compliance with the additionality principle for funds), and on developing and maintaining technological infrastructure. In short, development and cohesion between regions has to come from

convergence on R&D, which would make the European Union more competitive.

Financing for innovation must be available at all stages, not just the close-to-market ones, and make greater headway in the internal innovation market through a proper regulatory framework alongside public policies so that businesses maintain and improve their competitiveness.

The role of young people and financing of disruptive innovation must not be underestimated. Funding should not just be directed at technological innovation; knowledge which can be applied in the medium or long term is also generated in the social sphere, but may be disregarded on account of there being too great a focus on the market and immediate results, and failing to take account of a more overall vision.

However, scientific excellence, basic research, must continue to be a FP key priority in order to tackle the challenges the future will bring. Europe has internationally recognised centres of excellence, but needs more outstanding centres and regions. Ensuring that researchers' pay is not a stumbling block hindering their mobility, and that in assessing a centre the impact of its projects is not the key consideration, overshadowing the excellence of the centre itself, is important, as is encouraging the opening and participation of new centres and bodies.

For R&D to meet societal challenges it must be understood as structural and not of the immediate moment. Education is key. The connection between R&D and education, starting in early stages of schooling and continuing throughout the whole educational path, is vital. Society's involvement in research should be promoted and its findings and activities made widely known within the context of science for schools. R&D should be seen as a medium-to-long-term route, with society, and the pre-university educational community in particular, being better informed about the FP. The countries with the best results in science and innovation have flexible education systems that foster creativity, critical thinking and active participation by pupils. Adding the term 'education' to the ERA, making it the EERA, should therefore be proposed.

This re-orientation of education systems, with the emphasis on highly qualified human capital, is key to responding with new jobs to manufacturing work being replaced by technology.

The continual university has a vital role to play as the main source of knowledge and conditions enabling it to draw closer to innovation are required; the relationship between universities and the industrial sector must be strengthened to improve enterprises' capacity to innovate. The intermediary role played by technology parks should be provided for in this respect.

With reference to the public-private relationship backing H2020, the aim here is to help improve innovation in the industrial fabric and develop areas of interest for research. However, there should be a study conducted on the differences between big enterprises and SMEs, analysing whether they have similar resource needs, assessing their impact and checking that benefits are fair in their social impact. It should be made clear whether big enterprises do require public research funding, apart from for specific projects requiring major infrastructure, big budgets and with a high added value for the whole of society in the EU, or whether, on the contrary, an innovative framework and progress in the internal innovation market would be the most efficient contribution public policies could provide. Resource efficiency and the impact of findings are necessary. As regards SME participation, the answer lies in their predominance in Europe's industrial fabric and their need to improve their R&D capacities and growth.

Moreover, a return on public investment has to be guaranteed – not just through the social benefits of job creation – but also through the introduction of criteria on social responsibility and fairness to ensure the public can benefit from advances to which the public sector has contributed.

Open science, championed by H2020 for its incremental potential for knowledge itself and the economy, must be stepped up. Likewise participation by all stakeholders, both public and private, in support and access must be part of the necessary equilibrium and feedback that will enable all of knowledge's potential to be used.

With reference to social networks, the SSHs are fundamental to studying new challenges such as terrorism, populism, migration flows and inequality, and as such should receive cross-cutting recognition in all other scientific disciplines.

Moreover, social and healthcare challenges require greater effort and a holistic vision; clear responses are needed to demographic changes, the rise in chronic diseases, precision medicine or access to technologies, making healthcare and social service systems sustainable. Public health, prevention, environmental health, technology, digitisation and the relationship between health and society must all fit into an overall framework offering an effective, comprehensive and efficient response through the reforms needed in the EU's welfare system.

The commitment to understanding and fighting cancer is a top priority, with programmes in this field strengthened, as well as a firm and serious strategy to combat microbial resistance. Appropriate financing, a suitable framework and coordination of EU R&D resources are all called for here.

Lastly the agri-food sector in Europe is facing challenges to sufficiency, competitiveness, and social and environmental sustainability. It needs to step up research and innovation, and a more suitable framework enabling SMEs, which have to compete with foreign multinationals, to develop and apply innovation.

Greater effort is needed on gender equality. In none of the sectors, apart from the advisory sector, has the minimum percentage of 40 % of women has been reached. Figures for women sitting on expert panels or involved in major projects or their coordination are also still low. Their participation in the various societal challenges or the industrial pillar does not match progress made on their involvement in technological careers. In short, cross-cutting gender mainstreaming must be demanded, especially in project development, the line-up of research and evaluation groups and the disaggregation of data in assessing outcomes, as gender equality must be seen and understood as being necessary to a more unified society and wealth through the inclusion of greater knowledge and other viewpoints and needs.

As regards international cooperation, the figures show a fall compared to FP7, which must be reversed. Scientific diplomacy can play a key role in resolving some recent societal challenges. Initiatives such as PRIMA must be acknowledged as, in seeking answers to major challenges such as food security or water availability, they can contribute indirectly to immigration by increasing cooperation between countries and regions and improving their development.

The H2020 interim review enables conclusions to be drawn and recommendations made for the forthcoming FP9 in which account must be taken of the continuity, predictability and stability

of the scientific community and ongoing projects. Aside from those adjustments that must be made to respond to new challenges, the structure and underlying basis of H2020 must be strengthened and the following implemented: greater transparency, clarity and simplification; less fragmentation; better assessment and feedback with researchers; and ex-post monitoring and measurement of the impact of public funding.

There must be sufficient resources for FP9 and they must be guaranteed. Budget cuts while it is underway must be avoided. FP9 must be funded as befits an ambitious R&D programme and guaranteed a budget of EUR 100 billion as a starting point therefore.

In short, knowledge can and must contribute to the well-being of society and to the EU's competitiveness in the world, for which reason H2020 has to be regarded as a success and FP9 strengthened.

MOTION FOR A EUROPEAN PARLIAMENT RESOLUTION

on the assessment of Horizon 2020 implementation in view of its interim evaluation and the Framework Programme 9 proposal (2016/2147(INI))

The European Parliament,

- having regard to Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)¹,
- having regard to Council Regulation (Euratom) No 1314/2013 of 16 December 2013 on the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 Framework Programme for Research and Innovation²,
- having regard to Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)³,
- having regard to the Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 –the Framework Programme for Research and Innovation (2014-2020),
- having regard to Regulation (EU) No 1292/2013 of the European Parliament and of the Council of 11 December 2013 amending Regulation (EC) No 294/2008 establishing the European Institute of Innovation and Technology⁴,
- having regard to Decision No 1312/2013/EU of the European Parliament and of the Council of 11 December 2013 on the Strategic Innovation Agenda of the European Institute of Innovation and Technology (EIT): the contribution of the EIT to a more innovative Europe⁵,
- having regard to Council Regulations (EU) 557/2014, 558/2014, 559/2014, 560/2014 and 561/2014 of 6 May 2014⁶ and Council Regulations (EU) 642/2014⁷ and 721/2014⁸ of 16 June 2014 establishing the Joint Undertakings funded under Horizon 2020,
- having regard to Decisions (EU) 553/2014, 554/2014, 555/2014 and 556/2014 of the European Parliament and of the Council of 15 May 2014 establishing the Article 185

¹ OJ L 347, 20.12.2013, p. 104.

² OJ L 347, 20.12.2013, p. 948.

³ OJ L 347, 20.12.2013, p. 81.

⁴ OJ L 347, 20.12.2013, p. 174.

⁵ OJ L 347, 20.12.2013, p. 892.

⁶ OJ L 169, 7.6.2014, pp. 54-178.

⁷ OJ L 177, 17.6.2014, p. 9.

⁸ OJ L 192, 1.7.2014, p. 1.

P2Ps funded under Horizon 2020¹,

- having regard to the Issue papers for the High Level Group on maximising the impact of EU research and innovation programmes of 3 February 2017²,
- having regard to the Commission Horizon 2020 Monitoring Reports 2014 and 2015,
- having regard to the report from the Commission to the Council and the European Parliament entitled ‘The European Research Area: time for implementation and monitoring progress’ (COM(2017)0035),
- having regard to the Commission communication to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘European Defence Action Plan’ (COM(2016)0950),
- having regard to the report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘Implementation of the strategy for international cooperation in research and innovation’ (COM(2016)0657),
- having regard to the Commission communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘European Cloud Initiative – Building a competitive data and knowledge economy in Europe’ (COM(2016)0178) and the accompanying Commission staff working document (SWD(2016)0106),
- having regard to the Commission communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘On the Response to the Report of the High Level Expert Group on the Ex Post Evaluation of the Seventh Framework programme’ (COM(2016)0005),
- having regard to the report from the Commission to the European Parliament and the Council entitled ‘Annual Report on Research and Technological Development Activities of the European Union in 2014’ (COM(2015)0401),
- having regard to the Commission staff working document entitled ‘Better regulations for innovation-driven investment at EU level’ (SWD(2015)0298),
- having regard to the Commission communication to the Council and the European Parliament entitled ‘European Research Area: Progress Report 2014’ (COM(2014)0575),
- having regard to the Commission communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘Research and innovation as sources of renewed growth’ (COM(2014)0339),
- having regard to the Commission staff working document entitled ‘Second Situation

¹ OJ L 169, 7.6.2014, pp. 1-53.

² http://ec.europa.eu/research/evaluations/pdf/hlg_issue_papers.pdf.

Report on Education and Training in the Nuclear Energy Field in the European Union’ (SWD(2014)0299),

- having regard to the Commission staff working document entitled ‘FET Flagships: A novel partnering approach to address grand scientific challenges and to boost innovation in Europe’ (SWD(2014)0283),
 - having regard to the report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions entitled ‘Second Interim Evaluation of the clean sky, fuel cells and hydrogen and innovative medicine initiative Joint Technology Initiatives Joint Undertakings (COM(2014)0252),
 - having regard to the Opinion of the European Economic and Social Committee on the Role and effect of JTIs and PPPs in implementing Horizon 2020 for sustainable industrial change (CCMI/142),
 - having regard to its resolution of 16 February 2017 on the European Cloud Initiative¹,
 - having regard to the draft report of its Committee on Budgetary Control on cost effectiveness of the 7th Research Programme (2015/2318(INI)),
 - having regard to its resolution of 6 July 2016 on synergies for innovation: the European Structural and Investment Funds, Horizon 2020 and other European innovation funds and EU programmes²,
 - having regard to its resolution of 13 September 2016 on Cohesion Policy and Research and Innovation Strategies for Smart Specialisation (RIS3)³,
 - having regard to Rule 52 of its Rules of Procedure, as well as Article 1(1)(e) of, and Annex 3 to the decision of the Conference of Presidents of 12 December 2002 on the procedure for granting authorisation to draw up own-initiative reports,
 - having regard to the report of the Committee on Industry, Research and Energy and the opinions of the Committee on Budgets, the Committee on Regional Development and the Committee on Women’s Rights and Gender Equality (A8-0000/2017),
- A. whereas Horizon 2020 (H2020) is the EU’s largest centrally managed R&D programme;
- B. whereas, in negotiating H2020 and the current Multiannual Financial Framework (MFF), Parliament asked for EUR100 billion euros rather than the EUR 77 billion agreed and the budget seems very limited if H2020 is to fully explore excellence potential;
- C. whereas the interim evaluation planned for the 3rd quarter of 2017 will lay the foundations of the structure and content of FP9, on which a proposal will be published

¹ Texts adopted, P8_TA(2017)0052.

² Texts adopted, P8_TA(2016)0311.

³ Texts adopted, P8_TA(2016)0320.

in the first half of 2018;

- D. whereas the economic and financial crisis was a determining factor in the design of H2020, and new current challenges (such as populism, inequalities, migration and terrorism) and new political and economic paradigms are likely to shape the next research programme;
- E. whereas the Framework Programme (FP) must be founded on European values, scientific independence, openness, diversity, high European ethical standards, social cohesion and equal access by citizens to the solutions and answers it provides;

Structure, philosophy and implementation of Horizon 2020

1. Considers that, more than three years after the launch of H2020, it is time for Parliament to develop its position on its interim evaluation and a vision of the future FP9;
2. Recalls that the objective of H2020 is to contribute to building a society and an economy based on knowledge and innovation by leveraging additional national public and private R&D funding and by helping to attain the target of 3% of GDP for R&D by 2020; regrets that the EU invested only 2.03% of GDP in 2015, with the individual figures for different countries ranging from 0.46% to 3.26%¹;
3. Stresses that the evaluation of FP7 and monitoring of H2020 shows that the EU FP for research is a huge success²;
4. Considers that the reasons for its success are the multidisciplinary and collaborative setting and the excellence and impact requirements;
5. Understands that the FP intends to incentivise industry participation in order to increase R&D spending by industry³; regrets that industries have not increased their share of R&D spending; asks the Commission to assess the added value of funding for industry-driven instruments such as Joint Technology Initiatives (JTIs), which account for a large share of the budget⁴, and the coherence and transparency of all joint initiatives⁵;
6. Notes that the programme budget, management and implementation is spread over 20 different bodies; queries whether this results in excessive coordination efforts and redundancy; asks the Commission to reflect on how to simplify this;
7. Notes that Pillars 2 and 3 are too focused on higher Technology Readiness Levels (TRLs), which limits the future absorption of disruptive innovations that are still in the pipeline of research projects with lower TRLs; considers that TRLs exclude non-

¹ 'Horizon 2020, the EU framework programme for research and innovation. European Implementation Assessment'. European Parliament Research Service.

² With over 130 000 proposals received, 9 000 grants signed, 50 000 participations and EUR 15.9 billion of EU funding.

³ Two-thirds of the 3% of GDP for R&D should come from industry.

⁴ In total, the 7 JTIs account for more than EUR 7 billion of the H2020 funds, ca. 10% of the whole H2020 budget and more than 13% of the actual available funding for H2020 calls (ca. EUR 8 billion/year over 7 years).

⁵ See Council conclusions of 29 May 2015.

technological forms of innovation generated by fundamental or applied research, particularly from SSH;

8. Calls on the Commission to offer a balanced mix of small, medium and large-sized projects; notes that the average budget for projects has increased under H2020 and that larger projects require participants with large financial and staff capabilities; notes that this favours large institutions, creating a problem for smaller Member States and for small participants from larger Member States; regrets that this poses obstacles for newcomers and concentrates funding in elite institutions;

Budget

9. Stresses that the current low success rate of 14 % represents a negative trend compared to FP7; regrets that the cuts inflicted by EFSI have deepened this problem;
10. Insists that research can be a risky investment for private investors and that funding research practice through grants is a necessity; regrets the tendency, in some cases, to move away from grants towards the use of loans; recognises that loans must be available for high TRL, close to market activities, within other types of instruments (e.g. EIB schemes) outside of the FP;
11. Underlines that several Member States are not respecting their national R&D investment commitments; calls for the earmarking of Structural Funds for R&D activities, especially investments in capacity building, infrastructure and salaries, asks that the 3% of GDP target be met, and hopes that this can be raised to 4% in the not too distant future;

Evaluation

12. Confirms that ‘excellence’ should remain the key criterion across the three pillars, while noting that it is only one of the three evaluation criteria, alongside ‘impact’ and ‘quality and efficiency of the implementation’; calls for the reweighting of these criteria and invites the Commission to set out additional sub-criteria by adding ‘SSH integration and geographical balance’ under ‘impact’ and ‘project size’ under ‘efficiency of the implementation’;
13. Calls for better evaluation and quality assurance by the evaluators; takes note of the complaints made by unsuccessful applicants that the Evaluation Summary Reports lack depth and clarity on what should be done differently in order to succeed;
14. Call on the Commission to better define ‘impact’; stresses that the assessment of the impact of fundamental research projects should remain flexible and its relative weight in the evaluation procedure should be decreased; asks the Commission to check that the balance between bottom-up and top-down calls is maintained and to analyse which procedure (one or two stage) is more useful to avoid oversubscription;

Cross-cutting issues

15. Calls on the Commission to continue to enhance the societal challenges approach and emphasises the importance of collaborative research; underlines the need to reinforce some societal challenges such as innovation in agriculture and health, especially cancer and antimicrobial resistance research plans;
16. Notes that synergies between funds are crucial to make investments more effective; stresses that RIS3 are an important tool to catalyse synergies setting out national and regional frameworks for R&D&I investments; regrets the presence of substantial barriers to making synergies fully operational¹ such as the State Aid rules; calls on the Commission to revise the State Aid rules and to allow R&D structural fund projects to be justifiable within the FP rules of procedure;
17. Notes that the R&I capabilities of North/South and West/East Member States are very different; recognises the European dimension to the problem of the participation gap, which must be addressed by the FP if the EU is to exploit its full potential; welcomes, in this respect, the Widening Programme; calls on the Commission to assess whether the three Widening instruments have achieved their specific objectives and to clarify the rational and general goal of the Programme, to review the indicator used to define ‘underrepresented’ countries, and to keep a dynamic list that allows Member States to be in or out depending on how their capabilities evolve; calls on the Commission to adapt or adopt new measures to bridge this gap;
18. Recognises the importance of incorporating research and entrepreneurship skills into Member States’ primary and high school education systems in order to encourage young people to develop these skills, as R&D should be viewed in structural rather than cyclical or temporal terms; calls on the Member States and the Commission to enhance employment stability for young researchers; calls on the Commission to provide new increased levels of support for young researchers, such as a new funding scheme for early-stage researchers with less than three years of experience after PhD completion;
19. Confirms that international co-operation fell from 5% in FP7 to 2.8% in Horizon 2020; recalls that the FP should contribute to ensuring that Europe remains a key global player, while underlining the importance of scientific diplomacy; calls for a strategic vision and structure to support this objective and welcomes initiatives such as PRIMA;
20. Recalls that SSH integration means SSH research in interdisciplinary projects and not an ex-post add-on to otherwise technological projects, and that the most pressing problems faced by the EU require methodological research that is more conceptually focused on SSH; calls on the Commission either to introduce a minimum percentage dedicated to SSH funding, or to create an evaluation sub-criterion that takes account of its inclusion in projects;
21. Underlines that Horizon 2020 is not focused on the ‘valley of death’ that constitutes the main barrier to converting prototypes into mass production, and that H2020 is the first

¹ Large research infrastructure fits within the scope and goals of the ERDF, but ERDF funds allocated nationally cannot be used to co-finance it; construction costs associated with new research infrastructures are eligible under the ERDF, but operational and staff costs are not.

FP to put research and innovation together; welcomes the creation of an EIC¹, but insists that this should not lead again to the separation of research from innovation;

22. Calls on the Commission to clarify the instruments and functioning of the EIC; underlines the need to keep and strengthen the SME Instrument and the Fast Track to Innovation, and to facilitate funding for the final stages of research so that laboratory scientific innovations can develop into commercial businesses; asks the Commission to analyse also how KICs can be integrated into the EIC;
23. Welcomes initiatives which bring the private and public sectors together to stimulate research; regrets the low level of public return on public investment in some sensitive areas such as health; highlights the need for enhanced EU leadership in prioritising public research needs and a fair public return; calls on the Commission to study the possibilities of co-ownership of IP for key projects funded by FP public grants;
24. Welcomes the fact that Open Access is now a general principle under Horizon 2020; highlights that the number of publications linked to projects up to December 2016² shows that new policies on enforcing the free sharing of data and ideas are required in order to make all scientific data produced by future projects available by default, as the 100% objective is still a distant goal;
25. Welcomes the Open Science pilot funding as a first step towards an Open Science Cloud; recognises the relevance of e-infrastructures and supercomputing, the need for public and private sector stakeholders and civil society to be involved and the importance of citizen science in ensuring that society plays a more active part in the definition of the problems; calls for a scientific metadata structure and procedures for the generation of such data in order to feed the European OSC and ensure data exploitation; calls on the Commission and the public and private research community to explore new models that integrate private cloud resources and public e-infrastructures and the launch of citizen agendas in science and innovation;

FP 9 recommendations

26. Welcomes the success of H2020 and the 1:11 leverage factor; notes the oversubscription and the challenges that lie ahead, and calls for a budgetary increase of EUR 100 billion for FP9;
27. Calls on the Commission to separate military research from civilian research in the next MFF, since these must be two different programmes with two different budgets that do not affect the budgetary ambitions of FP9;
28. Welcomes the current pillar structure of the programme, and calls on the Commission to retain this structure for the sake of continuity and predictability, to improve the interaction among all funding instruments/programmes and to study the possibility of

¹ Commission Communication entitled 'Europe's next leaders: the Start-up and Scale-up Initiative' (COM/2016/0733).

² OpenAIRE report: In H2020, 2017 (19%) out of a total number of 10684 projects have ended and 8667 are ongoing. OpenAIRE has identified 6133 publications linked to 1375 H2020 projects.

having fewer instruments with harmonised rules; asks the Commission therefore to continue work on the coherence, simplification, transparency and clarity of the programme, on improving the evaluation process and on reducing fragmentation;

29. Calls on the Commission and the Member States to look for a solution to the research deficiencies facing convergence regions in some Member States, in application of the principle of additionality; regrets that financial allocations from the Structural and Investment Funds can lead to a reduction in national expenditure in regions where they apply, but insists that these must be additional to national public expenditure; calls also on the Commission and the Member States to ensure that investment in R&D is not accounted for as investment in relation to deficit objectives;
30. Underlines the need for new higher excellence centres and regions and the importance of continuing to develop the ERA; calls for policies to remove barriers such as lower salaries that are faced by Eastern and Southern countries in order to avoid brain drain, and for the excellence of the project to be prioritised over the excellence of 'elite' centres;
31. Notes that R&D investment by industry has not significantly increased; in view of the generally scarce resources for public R&D spending, calls for industrial competitiveness to be supported by differentiating between mature and emerging sectors, thus allowing larger or more mature industries to participate in projects more at their own cost or through loans;
32. Regrets the mixed set of results achieved by the gender equality focus in H2020, as the only target reached is the share of women in the advisory groups, while the share of women in the project evaluation panels and among project coordinators, and the gender dimension in research and innovation content, remain below target levels; encourages Member States to create a gender-positive legal and political environment and to provide incentives for change, and calls on the Commission to continue to promote gender equality and mainstreaming in FP9 and to consider the possibility of gender as a sub-criterion in the evaluation phase;
33. Notes that the next FP will have to take account of the UK's departure from the EU; notes that R&I benefits from clear and stable long-term frameworks, and that the UK has a leading position in the field of science; expresses the wish that networks and collaboration with entities in the UK can continue and that stable and satisfying solutions can be found quickly;
34. Instructs its President to forward this resolution to the Council and the Commission.

ANNEX

2. Origin, structure and purpose of the Horizon 2020 Framework Programme

2.1. Main issues to understand about the research framework programmes

European research policy has a legal base in the Treaty of Lisbon¹ which also introduced a legal basis for the creation of a European Research Area². So far, the European Commission has not taken legislative action in this domain and European research policy implementation has until now relied on soft law approaches. With the Research Framework Programmes, the EU started to become a player in research funding, with the main initial focus being on financing collaborative projects involving several Member States. Broadly speaking, only about 5% of the overall available European GBAORD³ is funded by the FP. Around 80% of the GBAORD is confined to Member States, and 15% is implemented by longstanding European intergovernmental organisations such as ESA, CERN, etc.⁴

Still, the GDP allocated to R&D is still comparatively low in the EU-28 in relation to Japan or the US. Moreover, most of the EU Member States, especially those in which the Excessive Deficit Procedure was launched, have cut their spending on R&D&I due to the economic crisis. The EU's share of world gross expenditure on research and innovation fell by 5% in the years from 2000 to 2013.

The first framework programme was established in 1983 for a four-year period. During the subsequent 30 years, successive FPs have provided financial support for the implementation of European research and innovation policies.

With the introduction of the European Research Area (ERA), the Open Method of Coordination and many other soft law approaches, the Union has started to coordinate national research policies (and eventually also national research programmes) since 2000. The FPs have always of course had a structuring effect on the national research systems, with the main idea of EU funding being to incentivise and leverage more national research funding. It was only with the introduction of 'ERA instruments' as of FP 6 (ERA-NETs, Article 185 initiatives), however, that this structuring influence became more evident and moved from the project level (at researcher and/or research unit level) to the Member State/funding bodies – or programme – level⁵.

The introduction of the ERA was accompanied by the launch of the Lisbon process and the definition of the Barcelona goal for national research funding to reach 3% of GDP in 2010. This goal was renewed by another call for research funding to reach 3% by 2020 – the so called Europe 2020 Strategy (A strategy for smart, sustainable and inclusive growth) which was launched in March 2010. Today, the attainment of the 3% target is monitored by the Commission in the context of the European Semester⁶ which is anchored upon extensive Member State reporting to the Commission. According to figures from 2015, the EU only invested 2.03%, with the individual figures for different countries ranging from

¹ See Title XIX, Research and technological development and space, Articles 179 to 190 TFEU.

² Article 182(5) TFEU.

³ GBAORD: Government budget appropriations or outlays for research and development.

⁴ Numbers have not significantly changed since 2009.

⁵ Arnold, Erik et alia: 'Understanding the Long Term Impact of the Framework Programme' Final report, December 2011.

⁶ The European Semester provides a framework for the coordination of economic policies between the countries of the European Union. It allows the EU Member States to discuss their economic and budget plans and to monitor progress at specific times throughout the year. Having assessed the EU governments' plans (which detail the specific policies each country will implement to boost jobs and growth and prevent/correct imbalances, and their concrete plans to comply with the EU's country-specific recommendations and general fiscal rules), the Commission presents each country with a set of country-specific recommendations, along with an overarching Communication.

0.46% to 3.26%.¹

In terms of topics funded, the purpose of the FPs has changed gradually from initially being an industry-focused programme to slowly opening up to basic research activities in universities. With the exception of the introduction of the European Research Council (ERC) funding for basic and frontier research only, the common feature of the FPs over the years was that they were always mission-oriented programmes serving commonly defined goals. The process in place for their adoption is through the co-decision procedure (now called the ordinary legislative procedure).

Finally, with the launch of the seven flagship initiatives in the context of the Europe 2020 Strategy in March 2010, the European Innovation Union² was introduced and with it the prerogative for innovation and competitiveness in Europe also moved into the research policy domain. H2020 is now one of the main tools with which the Innovation Union is being implemented.

2.2. Horizon 2020 - Overview

There is extensive information on H2020, its structure, rules and functioning³, that does not need to be repeated here in detail. The description of the H2020 programme is limited to an illustration of the most relevant issues for the recommendations by the European Parliament.

As such, H2020 differs enormously from previous FPs insofar as it made the move to more research-generated innovation compulsory and introduced a more interdisciplinary impact-oriented societal challenge approach in contrast to the previous more mono-disciplined and sectoral approach taken until FP7. The approach of formulating mission-oriented programmes with predefined research results and prescribed research methods was abandoned in favour of a more openly defined societal challenge-oriented approach, in which the results are left open-ended and evolve over time. This approach also favours the early involvement of societal actors and opens the programme up to newcomers. Issues of transversal importance, such as the SME instrument or measures to improve synergies between H2020 and the structural funds, were also introduced.

H2020 is the world's biggest Research and Innovation programme with nearly €80 billion of funding available over 7 years (2014 to 2020), and places the emphasis on excellent science, industrial leadership and tackling societal challenges. Its goals are to ensure that Europe produces world-class science, to foster innovation, and to make it easier for the public and private sectors to work together in delivering research and innovation.

Horizon 2020 is built around three main objectives:

- 1) Support for 'Excellent Science' – including grants for individual researchers from the European Research Council and Marie Skłodowska-Curie fellowships (formerly known as Marie Curie fellowships);
- 2) Support for 'Industrial Leadership' – including grants for small and medium-sized enterprises and indirect finance for companies through the European Investment Bank and other financial intermediaries;
- 3) Support for research to tackle 'societal challenges'. During negotiations between the European Parliament and the Council it was decided to support research aimed at meeting seven broad challenges:
 1. Health, demographic change and wellbeing

¹ 'Horizon 2020, the EU framework programme for research and innovation. European Implementation Assessment'. European Parliament Research Service.

² http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=key.

³ e.g. EPRS Briefings, H2020 Participant Portal, National Contact Point websites, etc.

2. Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bio-economy
3. Secure, clean and efficient energy
4. Smart, green and integrated transport
5. Climate action, the environment, resource efficiency and raw materials
6. Inclusive, innovative and reflective societies
7. Secure and innovative societies

It also has two specific objectives:

- 4) Spreading excellence and widening participation
- 5) Science with and for society

and two separate institutions:

6) European Institute of Innovation and Technology (EIT)

7) The non-nuclear direct actions of the Joint Research Centre.

A number of priorities will be addressed across and within all three pillars of Horizon 2020. These include gender equality and the gender dimension in research; social and economic sciences and humanities; international cooperation; and fostering the functioning and achievement of the European Research Area and Innovation Union, as well as contributing to other Europe 2020 flagships (e.g. the Digital Agenda). At least 60% of the overall Horizon 2020 budget should be related to sustainable development, and climate-related expenditure should exceed 35% of the budget.

The management and implementation of the programme is complex. The overall budget for H2020 is managed by 9 different Commission Directorates-General and the JRC. Overall, 22 bodies implement different parts of the Horizon 2020 budget:

- five Commission DGs
- four executive agencies
- four public-public partnerships (P2Ps)
- seven public-private partnerships (PPPs)
- the European Institute of Innovation and Technology (EIT)
- the European Investment Bank (EIB).

The following graph tries to capture the complexity of the management and implementation of H2020



The specific programme is implemented by multiannual work programmes. Implementing powers are conferred on the Commission to adopt work programmes for the implementation of the specific programme. Several programme committees (each pillar has a number of committees and there is a main overall ‘strategic configuration’ committee) were set up to assist the Commission in preparing the work programmes. The preparation of work programmes also involves the consultation of stakeholders. For this purpose 19 Horizon 2020 Advisory Groups have been set up as consultative bodies to represent the broad constituency of stakeholders ranging from industry and research to representatives of civil society. Additional open and targeted consultation activities aim to obtain further views and contributions, including from the Enterprise Policy Group, the contractual Public-Private Partnerships (cPPPs), European Innovation Partnerships and European Technology Platforms.

3. The transition from FP 7 to Horizon 2020 and main improvements brought by Horizon 2020

The FP7 Final Evaluation Report by the High Level Expert Group¹ confirms that the move from FP7 to an adapted structure under H2020 was beneficial for the European research community and the logical next step at the time of the launch of H2020. The total budget of H2020 has been increased to about 77 billion euro which is nearly 50% more than the FP7 budget. H2020 integrated elements from FP7 and existing, previously separate, funding programmes (CIP and EIT), which also accounts for the increase in the budget. However, in 2015, the planned budget for H2020 was cut by 2.2 billion euro to support the European Fund for Strategic Investments (EFSI). These cuts did not affect the ERC, Marie Skłodowska-Curie Actions and the ‘Spreading excellence and widening participation’ programme, but fell on ‘Excellent Science’ (cut by 209 million euro), ‘Industrial Leadership’ (cut by 549 million euro) and ‘Societal Challenges’ (reduced by 1 billion euro).

The main improvements brought by H2020 as compared to its predecessor programmes can be summarised as follows²:

- High share of newcomers³ in H2020 grant participation

The share of newcomers in 2014 and 2015 amounts to 49.0% of all participants on average for the entire H2020. The different programme parts display large differences in the share of new participants. The lowest share of newcomers is found in the Excellent Science Pillar, with the ERC having 1.4% of newcomer participations from calls in the first two years of Horizon 2020. The highest share of newcomers was recorded in the SME Instrument, where almost 79.6% of the participations came from organisations that had not taken part in FP7. The average for the Societal Challenge actions was 27.9% and within Industrial Leadership it was around 27.1%.

The share of newcomer participation per Member State differs between the EU-13 and EU-15. On average the EU-13 has a higher share (30.6%) of newcomer participation than EU-15 (24.7%). Malta and Romania had the highest shares of newcomer participation at 42.9% and 40.0% respectively, while Greece and United Kingdom had the lowest at 16.3% and 15.6%.

- Much shorter time-to-grant

¹ Commitment and Coherence: Ex-Post-Evaluation of the 7th EU Framework Programme (2007-2013), November 2015:

https://ec.europa.eu/research/evaluations/pdf/fp7_final_evaluation_expert_group_report.pdf#view=fit&pagemode=none

² Horizon 2020 Monitoring Report 2015:

http://ec.europa.eu/research/evaluations/pdf/archive/h2020_monitoring_reports/second_h2020_annual_monitoring_report.pdf

³ Newcomers are defined as not having participated in FP7.

Compared to FP7, the first two years of implementation of Horizon 2020 have shown a significant reduction in the time that elapsed between the closure of a call and the signature of the Grant Agreement (the so-called time-to-grant – TTG). Under Horizon 2020, the Commission has committed itself to signing grant agreements within a period of eight months (245 days) for actions other than ERC actions. The average for both 2014 and 2015 is 90.7%. This constitutes a significant 33.4% improvement on the average TTG for the whole of FP7 (303 days).

- Proven simplification

Compared to FP7, the design of Horizon 2020 brought a number of important simplifications:

- ✓ A radically simplified funding model.
- ✓ Under the MSCA, the use of simplified forms of grants.
- ✓ Streamlined ex-ante checks.
- ✓ Reduced requirements for work-time recording.
- ✓ Reduced audit burden.
- ✓ Faster granting processes.
- ✓ Fully paperless proposal and grant management.

4. Main areas of concern with the current H2020 implementation

The European Parliament has also identified areas of concern based on consultations with representatives of the research community in Europe:

- Oversubscription - Lower success rate in H2020 as compared to FP7

The average success rates are substantially lower in H2020 than in FP7 (average of 19% from 2007 to 2013¹) and different potential reasons for this are currently being discussed. These include research budget cuts in Member States, a less prescriptive approach in drafting the call texts in the work programmes allowing for more newcomers, and broader application of the two-stage proposal schemes.

Furthermore, the increased attractiveness of the programme also explains the growing interest in Horizon 2020. In total, over 8 500 more proposals were submitted in 2015 than in 2014. This is reflected in lower success rates in 2015 than 2014 throughout Horizon 2020: in terms of numbers of proposals, from 13.2% to 10.7%, and in terms of funding, from 14.2% to 10.9%.

One worrying finding is the fact that an ever larger number of high quality proposals scoring above the threshold in the project proposal evaluation cannot be funded. A mere 22.7% of the proposals which scored above the threshold were retained for funding in 2015. This constitutes a significant decrease of 8.8 percentage points compared to 2014. In total for Horizon 2020, about one in four high quality proposals submitted was selected for funding. In numbers, 25 116 high quality proposals in the first two years of Horizon 2020 were not funded². This means that 77.3% of successful proposals could not be funded. The Commission calculates that H2020 would have needed an additional EUR 41.6 billion in the first two years to fund all proposals deemed excellent by independent evaluators. The extrapolated figure for the years to come until the end of the programme amounts to an additional EUR 145.6 billion

¹ Seventh FP7 Monitoring Report 2013, see page 10:

http://ec.europa.eu/research/evaluations/pdf/archive/fp7_monitoring_reports/7th_fp7_monitoring_report.pdf

² Horizon 2020 Monitoring Report 2015:

http://ec.europa.eu/research/evaluations/pdf/archive/h2020_monitoring_reports/second_h2020_annual_monitoring_report.pdf

if H2020 is to exploit European excellence potential to the maximum.

Table: Overall Success Rates¹

Success Rates				
	Eligible proposal success rate	EU financial contribution success rate	Applications success rate	Share of High Quality Proposal funded
2014	13.2%	14.2%	15.4%	31.5%
2015	10.7%	10.9%	11.2%	22.7%
Total	11.8%	12.3%	13.1%	26.3%

Source: Corda, calls in 2014 and 2015, Signed Grants cut-off date by 1/09/2016 (excluding grants to named beneficiaries)

- Participation by third countries dropped by half

Horizon 2020 should contribute to maintaining the status of Europe as a key global player, in direct competition with the world's top performing research regions. To achieve this, the programme should have a strategic vision and structure to support Europe in this. It should fulfil a strategic role when it comes to European co-ordination/prioritisation. In a nutshell, Horizon 2020 should be open, but in a strategic way.

However, the share of third country participation in FP7 was higher (i.e. 4.0% for all projects and 4.3% for collaborative projects). In H2020, third country participation in internationally open collaborative projects increased from 2.1% in 2014 to 2.8% in 2015, and for all projects from 1.7% in 2014 to 2.0% in 2015.

This has to do with the fact that the Commission has taken a radically new approach to international collaboration in H2020 as compared to FP7, changing the funding regime for third countries and abandoning the former INCO. The latter was replaced by strategic programming and roadmaps including flagship initiatives for collaboration with targeted non-EU countries. Much emphasis was also placed on multilateral funding through Member States. However, and especially when addressing the societal challenges as defined in H2020, a global approach requiring the involvement of all actors worldwide is imperative.

- Insufficient definition of impact in H2020 projects

There are some concerns about the fact that the underlying definition of impact for H2020 projects poses problems for both project evaluators and researchers carrying out the project. In the long run, a fuzzy definition of impact will also disappoint research funders who will not be satisfied with the research outcomes. Collectively and especially when addressing societal challenges, the Commission and national governments will need to improve tracking outcomes and impact as well as broaden the definition of what constitutes impact. Different types of research produce different types of impact and evaluation processes need to reflect this. This discussion is connected with the need to better determine the place of innovation and the corresponding TRLs in research programme and project formulation. An overhaul of the H2020 indicators measured by DG RTD is needed.

It is to be noted that the legal base of H2020 states that it should support all stages of the research and innovation chain, so a concentration only on higher TRL levels is not a legal obligation but a political choice. The currently required high TRLs in Pillar 3 make it hard for vast sectors of the research landscape, such as universities, to compete. Focusing only on higher TRLs, while important to boost European industrial competitiveness, may limit the future absorption of disruptive innovations that are still in the pipeline of research projects with lower TRLs.

¹ Same source as for footnote 15.

Generally, TRLs are based on a narrow perception of innovation as a linear model. TRLs thus do not capture the full complexity and bandwidth of innovation and exclude non-technological forms of innovation generated by fundamental or applied research, particularly from SSH research.

To a considerable extent, whole areas of research are being excluded from Horizon 2020 simply because the value they bring to society is not reflected well in the current impact and innovation definitions.

- Lost focus on the European Research Area

It seems that current policymakers both in Member States and the Commission have lost interest in ERA. ERA progress reports have been launched since 2013 and one would as a consequence assume that a better database for ERA monitoring would also lead to common targets or corrective measures which would make the realisation of ERA successful. This is still not the case.

There are some concerns about this Commission's reluctance to continue with the European Research Area project which is even anchored in the Treaty of Lisbon. H2020 should not come on top of what Member States are doing nationally and operate in isolation from them, but should be intrinsically linked, coordinated and aligned with Member States' activities (as also laid down in the TFEU). H2020 should act as a pull factor for ERA to work better and should demonstrate clear EU added value. The overall poor progress made by Member States in reaching the 3% goal for GDP allocation to R&D by 2020 is intrinsically linked to this lost focus on ERA. In this respect joint programming, in which Council began to play a bigger role, is essential for ERA because it incentivises countries to prioritise nationally and enhances capacity building by collaborating across borders. Council should play a stronger role in defining common grand societal challenges that are then reflected in the Joint Programming Initiatives and in Horizon 2020.

The introduction of the 3 O's¹ by Commissioner Moedas, after having declared that ERA was completed, reduced the potential of European research policy to marginal operational details within the much wider scope of ERA.

Taking ERA seriously would also improve the discussion on cohesion versus excellence within Europe. ERA is about capacity building, about national and regional coordination across borders, fostering mutual learning, avoiding redundancies and acting in a more strategic and efficient manner. Transnational cooperation has always been a good test bed to gather experience in order – at a later stage – to compete better when participating in H2020.

- Addressing the innovation valley of death

The innovation process is characterised by the existence of a hard step between the development of an innovative product and its commercialisation. This gap is known as the innovation 'valley of death'. SMEs are specifically vulnerable to this issue. They therefore need support to overcome this gap. A potential European Innovation Council (EIC), as proposed by Commissioner Moedas, should try to analyse the gaps and take action where needed.

A lot has been done already with the introduction of the Fast Track to Innovation and the SME Instrument which focuses on very high TRLs. However these had very low success rates (7%). One possibility, rather than investing even more, could be to decomplexify the EU funding landscape. There might be enough out there, but information on it is lacking.

This should not be the sole task of H2020 and other programmes should play a bigger role. H2020 cannot be overburdened to solve everything.

¹ Open Science, Open Innovation, Open to the World. Speech by Carlos Moedas, Commissioner for Research, Science and Innovation at the conference 'A new start for Europe: Opening up to an ERA of Innovation' in Brussels, 22 June 2015.

- Widening participation

Despite the Sharing Excellence and Widening Participation instruments launched in the Horizon 2020 programme with its total budget of 816 million euro, there has been no significant increase in the share of low-performing European countries and regions in the framework programme.

Europe needs cohesion in terms of excellence and competitiveness and Horizon 2020, together with efforts by each Member State, are instruments to achieve that goal.