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Horizon 2020

Work Programme 2016 - 2017

Table of Contents

and

1. General Introduction

Important notice on the second Horizon 2020 Work Programme

This Work Programme covers 2016 and 2017. The parts of the Work Programme that relate to 2017 (topics, dates, budget) have, with this revised version, been updated. The changes relating to this revised part are explained on the Participant Portal.

(European Commission Decision C(2017)2468 of 24 April 2017)



Table of Contents

This table of contents lists the separate parts of the Horizon 2020 Work Programme (2016-2017).

1. General Introduction
- Excellent science**
2. Future and Emerging Technologies
3. Marie Skłodowska-Curie actions
4. European research infrastructures (including eInfrastructures)
- Industrial leadership**
5. Leadership in enabling and industrial technologies (LEITs)
 - Introduction to LEITs
 - i. Information and communication technologies
 - ii. Nanotechnologies, Advanced materials, Advanced manufacturing and processing, Biotechnology
 - iii. Space
6. Access to risk finance
7. Innovation in small and medium-sized enterprises
- Societal challenges**
8. Health, demographic change and wellbeing
9. Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy
10. Secure, clean and efficient energy
11. Smart, green and integrated transport
12. Climate action, environment, resource efficiency and raw materials
13. Europe in a changing world – inclusive, innovative and reflective Societies
14. Secure societies – Protecting freedom and security of Europe and its citizens
- Spreading excellence and widening participation**
15. Spreading excellence and widening participation
- Science with and for society**
16. Science with and for society
- Cross-cutting activities – focus areas**
17. Cross-cutting activities – focus areas
- Fast Track to Innovation Pilot**
18. FTI Pilot
- Dissemination, Exploitation and Evaluation**
19. Dissemination, Exploitation and Evaluation
- Annex**
20. General Annexes

General Introduction

- 1.1 Overview and summary
- 1.2 Political context
- 1.3 Key priorities for 2016-2017
- 1.4 Cross-cutting and other key features
- 1.5 Communication, open access to research results and a new emphasis on data management
- 1.6 Complementarity with other Work Programmes
- 1.7 Key websites

1.1 Overview and summary

The Horizon 2020 Programme strongly supports the three strategic priorities¹ of Open Innovation, Open Science, and being Open to the World.

Open innovation is about combining diverse sources of knowledge to innovate, underpinned by networked, multi-collaborative innovation systems and involving researchers, entrepreneurs, investors, users, governments and civil society. Favouring Open Innovation means encouraging the capitalisation of results from European research and innovation. Open Science includes moving forward on the need for more open access to research results and the underlying data. The Commission is therefore extending its Open Research Data Pilot to cover all thematic areas of Horizon 2020 whilst maintaining robust opt-out options. Open Science also entails the need for new initiatives to strengthen research integrity for policy makers, research funders, research institutions and researchers. Open to the World means to engage more in science diplomacy and in global scientific and technological collaboration to remain relevant and competitive, and to lead the way in developing global research and innovation partnerships to address global challenges.

Horizon 2020 spans seven years (2014 to 2020), and is the biggest EU Research and Innovation funding programme ever. The Horizon 2020 Specific Programme is implemented through two-year work programmes setting out funding opportunities under the different parts through calls for proposals containing topics, and the other actions such as public procurements.

The 'General Introduction' to the second Horizon 2020 Work Programme covering the years 2016-17 explains the context in which the Work Programme was developed, and contains guidance to help those submitting proposals for EU research funding.

This second Work Programme is completely new in terms of content, building on the achievements of the first Horizon 2020 Work Programme which was for 2014-15, and which received an overwhelmingly positive response with strong demand from the research and innovation stakeholder communities.

Through this new Work Programme, Horizon 2020 will continue to fund researchers and innovators at the cutting edge of their fields working on the latest breakthroughs; it will support projects across the cycle from research to innovation; it will create opportunities to build research teams in Member States where the innovation and research potential is underexploited; it will encourage the training of researchers including exchanges of researchers between industry and academia; it will take a strategic approach to international cooperation in research and innovation; and through a suite of financial instruments it will help to plug the gap between innovative research and its exploitation.

In determining the contents of this Work Programme in line with the Horizon 2020 Specific Programme, the Commission has continued with its strategic programming process which was begun with the first Horizon 2020 Work Programme. The aim is to maximise the impact of the available EU funding through an integrated, coherent, evidence-based implementation.

On this basis, criteria used for selecting the priorities to be supported in the Work Programme 2016-2017 were: the maximising of EU added value; addressing and anticipating research and innovation key trends and areas of high potential for world-class breakthroughs; providing

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

strong potential for impact and uptake and leverage of industry and SME participation, by addressing the demand side, tackling barriers to innovation and market deployment and uptake, and building collaborations between industry, businesses, universities and research institutions; providing genuinely cross-cutting approaches and embedding key novelties such as covering the full research and innovation cycle, social science and humanities, gender aspects, and climate and sustainable development; improving international cooperation by focusing on key strategic and targeted areas of common interest and mutual benefit one example of which being Euro-Mediterranean cooperation in the field of Research and Innovation, including the work done to date by the PRIMA initiative participating States.

The strategic programming approach takes into account new intelligence on scientific, technological, economic, market, and social trends and foresight, as well as emerging policy needs. It has involved extensive consultations, notably through the Horizon 2020 Programme Committee and advisory structures.

In line with the strategic objectives for the Work Programme and to provide clear information to proposers, wherever possible guidance has been provided for each topic in the Work Programme on the order of EU financial contribution which the Commission considers would allow the relevant specific challenge to be addressed appropriately.

The Horizon 2020 Work Programme 2016-17 comprises 20 parts, including one on Dissemination, Exploitation and Evaluation, and the General Annexes, which set out the funding opportunities under the different parts of the programme. These describe the overall objectives, the respective calls, and the topics within each call. Each topic describes the specific challenge to be addressed, the scope of the activities to be carried out, and the expected impacts to be achieved.

Proposals can be submitted in the calls for proposals shown on the Participant Portal.

The General Annexes, part 20 of the Work Programme, have been revised and updated with respect to those for the 2014-15 Work Programme, and contain: a list of countries eligible for funding, and applicable rules; standard admissibility criteria and related conditions; standard eligibility criteria; types of action: specific provisions for innovation procurement; rules of contest for Prizes; a description of Technology Readiness Levels (TRL); a description of the evaluation criteria; a note on budget flexibility; classified information; and financial support to third parties.

This Work Programme continues with the approach of the first Horizon 2020 Work Programme to have fewer calls and topics, as compared with Framework Programme 7 (FP7). These are generally broader and encompass a range of possible approaches. In most cases more than one possible action is envisaged for a particular topic. The Work Programme reflects the strong challenge-based approach of Horizon 2020, allowing applicants to have considerable freedom to come up with innovative solutions.

This Work Programme incorporates improvements based on the lessons learned from the first Horizon 2020 Work Programme, notably in the need to continue with the open approach to calls; better use of the new instruments promoting innovation in the Work Programme cycle; reinforcing the broad approach to innovation extending beyond technological and research-based innovation and including social innovation and user innovation; promoting SME participation in calls for collaborative projects and other grant-based instruments; promoting the SME instrument; proactive integration of social sciences and humanities aspects; improved addressing of the gender dimension; better targeting of potential international cooperation; reinforcing the quality of proposal evaluation; and standards for feedback to applicants.

Further efforts in particular have been made to ensure cross-cutting issues (e.g. social sciences and humanities, gender, international strategy) have been mainstreamed in each of the different parts of the Work Programme, ensuring an integrated approach.

This Work Programme makes further progress on streamlining the presentation, with access via the web, and tools to allow ease of access including smart searches.

While this Work Programme covers the large majority of the funding available under Horizon 2020, it is complemented by the separate Work Programmes for the European Research Council, Euratom, the Joint Research Centre, as well as the Strategic Innovation Agenda for the European Institute of Innovation and Technology (EIT).

1.2 Political context

Although there are positive signs, the EU still has a long way to go before it overcomes the effects of the economic crisis and the high unemployment rate, especially amongst young people, remains the biggest concern and challenge in many Member States. The five point strategic agenda for the Union in times of change set by the European Council and followed up by the Commission's agenda for jobs, growth, fairness and democratic change is a strong response to the challenges we face, namely by strengthening our global competitiveness, stimulating investments from both public and private sources, promoting growth and creating new and sustainable jobs for the benefit of the economy and citizens.

The agenda of the Commission sets out ten policy areas on which the EU needs to focus its efforts over the next years. This includes maximising the opportunities and assets of the EU by fully exploiting the potential of the single market as well as of international markets and reinforcing its global attractiveness as a place of production, investment, education and living, thus delivering benefits for all by promoting a climate of entrepreneurship, job creation and social fairness. In the present context the migration challenge also requires new research and innovation actions and a better integration of displaced researchers in Europe.

Research and innovation represent major drivers to both stimulate and leverage investment, providing new solutions and the knowledge which will help to deliver the Commission's agenda. By coupling research and innovation, and its emphasis on excellent science, industrial leadership and tackling societal challenges, Horizon 2020 will: mobilise innovative financial instruments; facilitate investment in research infrastructures and skills; maintain and reinforce a high-performing primary sector and industrial base; enhance the use of digital technologies and ICT solutions; capitalise on and promote further our existing strengths in renewables and energy efficiency; contribute to combatting cross-border crime and terrorism while also guaranteeing fundamental rights and values and protecting Europeans' personal data; provide new insights for policy-making towards reversing inequalities and promoting fairness; enhance collaborations between the public and private sectors in delivering innovation; and maximise potential synergies with the European Structural and Investment Funds at national and regional level.

1.3 Key priorities for 2016-2017

On the basis of the strategic programming process, including a broad consultation of stakeholders, and the Horizon 2020 Specific Programme, key priorities for 2016-2017 have been identified. In alignment with the Commission's agenda, the Work Programme for 2016-2017 will contribute to the Jobs, Growth and Investment Package helping to strengthen

Europe's global competitiveness, create new and sustainable jobs and promote growth. All the calls for proposals and activities will contribute substantially to this policy area as well as contributing in broader terms to one or more of the other policy areas.

A new Boost for Jobs, Growth and Investment

Investments will cover both the immediate need to engage the re-industrialisation of Europe as well as the longer-term objective of building solid knowledge needed for the next wave of innovative breakthroughs. A substantial number of Horizon 2020 activities, including innovative forms of financing, are in particular targeted at mobilising additional public and private investment in the European economy and thereby help promote a climate of entrepreneurship and job creation. Investment in researcher skills and competences relevant for the evolving needs of both public and private employers will at the same time respond to the increasing demand for the best talent and will also contribute to strengthening Europe's competitiveness. In particular the following activities are prominent elements contributing to the Jobs, Growth and Investment Package in both the short and longer term:

- As part of the **Innovation Investment Package** representing an investment worth over EUR 22 billion, seven **Public-Private Partnerships** (PPPs) relevant to industry in the fields of innovative medicine, fuel cells and hydrogen, aeronautics, bio-based industries, electronic components and systems, railways, and EU air traffic management system, address strategic technologies that underpin growth and jobs in key European sectors and can help make the EU a more attractive location for international companies to invest and innovate. Complementarity of the work programme with all these activities has been sought to ensure synergies, while avoiding overlaps. These PPPs are complemented by a similar level of investment in **contractual Public Private Partnerships** (cPPPs) implemented through the work programme, on Factories of the Future (FoF); Energy-efficient buildings (EeB); European Green Vehicles Initiative (EGVI); Sustainable Process Industry (SPIRE); Advanced 5G Network Infrastructure (5G); Robotics; Photonics; High Performance Computing (HPC), and Big Data Value and the recently adopted Cybersecurity, to develop new technologies, products and services which will have a substantial impact on the competitiveness of EU industry, and the creation of new high-skilled jobs in Europe.
- Further investments through **financial instruments**, targeted in particular to small and medium-sized enterprises (SMEs), will contribute to the availability of a wider range of debt and equity financing products and facilities to support research and innovation; a stronger venture capital and wider equity industry; the increased involvement of business angels, crowd-funding platforms and philanthropic foundations in funding research and innovation; and more investment in technology transfer. Synergies with the European Fund for Strategic Investments (EFSI) will be promoted.
- Through the European Research Council (ERC), the most talented and creative individual researchers and their teams will be able to investigate the best ideas, based on **excellence**, and carry out frontier research of the highest quality which could lead to new innovative breakthroughs. (this is the subject of a different Work Programme)
- Investing in the skills and competences of the **next generation of excellent researchers** to enable them to face current and future challenges remains the main focus of the Marie Skłodowska-Curie actions. Innovative approaches to research training with exposure to the non-academic sector and the stimulation of

interdisciplinary, international and inter-sector mobility will be particularly promoted. The Societal Challenges and Leading and Enabling Industrial Technologies (LEITs) will contribute to the new skills and competences needed to deliver on innovation, growth and participation in a modern society.

- **Future and emerging technologies** activities help to create in Europe a fertile ground for responsible and dynamic multi-disciplinary collaborations and for kick-starting new European research and innovation eco-systems around them. These will be the seeds for future industrial leadership and for tackling societal challenges in new ways.
- The development, implementation and sustainable operation of pan-European **research infrastructures** help Europe to respond to grand challenges in science and society and boost the productivity and competitiveness of our economy. In this context, e-infrastructures become crucial as a cross-cutting support layer in the storage, transmission and processing of the surging volumes of data. Access to modern and world-class research infrastructures is important for Europe's ability to create cutting-edge research, educate, retain and attract the best research talent and connect researchers globally. Furthermore, partnerships with industry and SMEs on key technologies need to be exploited to foster innovation and create new market opportunities.
- **Closing the research and innovation divide** to bring innovations to all corners of the EU will remain a key objective, in particular through the new actions on Teaming, Twinning and ERA Chairs.

A substantial number of activities across the work programme are dedicated to support **EU manufacturing**. The '4th Industrial Revolution' which is underway, will bring dramatic changes in our working and living environments due to the rapid development of IT infrastructure and the linking of the physical and the virtual worlds to form cyber-physical systems. The digitalisation of industry is also giving a new impetus to all types of firms to develop capabilities to provide services, further blurring boundaries between goods and services. The range of innovative new product-service systems that service providers and manufacturers can offer is already increasing. This offers huge potential for increasing flexibility and productivity, but also resource efficiency and new ways to sustainability in the production and service sector, as well as in everyday life. It is a unique chance for clean, safe and smart "made in Europe".

Other important activities include a call to enhance the innovation capacity of SMEs and the SME Instrument, whose main focus in 2016-2017 will be on facilitating market uptake of innovation, including in international markets and through facilitated access to risk finance and synergies with national or regional support programmes; and the Fast Track to Innovation pilot aimed at reducing the time from idea to market and thus accelerating the development of innovative products, processes and services. In line with the key objective of simplification, the SME instrument is implemented (Industrial Leadership and Societal Challenge pillars) in a predominately bottom-up manner.

A Connected Digital Single Market

Digitalisation offers huge potential for Europe's economy and society. It influences the way we work, communicate and live and empowers customers and end-users in unprecedented ways. It enables new services and innovative business models and modifies the value chains and networks in all sectors of the economy. We need to step up our effort to make much better use of the economic opportunities digitalisation provides. Promising new developments

within the digital domain will be addressed in the next work programme, thereby facilitating the creation of new infrastructures and platforms to experiment, pilot and demonstrate new ways of doing things with consumers and users based on their needs and behaviour, while at the same time addressing the concerns of citizens in areas such as cyber security and trust. Activities will also help boost digital skills and learning across society, including the development and use of language technologies. The following activities will in particular contribute to key knowledge and innovative solutions and support the creation of secure digital ecosystems for fast growth and competitive leadership in key industrial sectors:

- The Internet is accelerating innovation, reshaping established industries, facilitating new ways of doing business, and transforming social behaviours. An integrated response to the technology challenges and innovation needs is required to position Europe at the forefront of the Internet developments. The **Internet of Things** call will allow complementing technology developments with large-scale pilots in a number of societal challenges, thus demonstrating actual solutions in real-life settings.
- **Automated Road Transport** drives a paradigm shift in the automotive sector, with decisive implications for the competitiveness of the European industry. It will improve drastically safety and reduce congestion, while contributing to increase energy efficiency and decrease emissions. The call will address component development, human-machine interactions, testing of vehicles and integration with infrastructure, as well as transition scenarios, standards, user behaviour and acceptance.
- ICT-driven transformations bring opportunities across many important sectors but also vulnerabilities to critical infrastructures and services, which can have significant consequences on the functioning of society, economic growth and the technological innovation potential of Europe. The **Digital Security** call will address these issues through innovative approaches and will be complemented by actions on privacy and ethics recognising the importance of protecting our fundamental right to data protection. Topics will be contributing to the objectives of the recently established cybersecurity cPPP.
- Data sets continue to grow larger and more complex. This trend calls for new and better techniques for extracting, managing, analysing and sharing both data and the results of data analyses, while respecting the privacy rights of individuals and the needs for government and corporate confidentiality. Activities on **Big Data** will help accelerate the progress of scientific discovery and innovation, and foster the development of Europe's data-driven economy emphasising a cross-cutting approach, as the research challenges for big data span across many scientific and technical domains, with promising application prospects in numerous areas such as health, energy, transport, climate action, culture, manufacturing and government, the development and use of language technologies, and spanning both goods and services.

In addition, a call will contribute to maintain and develop the EU position for leading edge technology in key areas such as electronics, photonics, embedded systems, computing, robotics, network technologies and systems or content technologies. Access to research data increases returns from public investment, reinforces open scientific inquiry, and enhances the quality and efficiency of scientific research and innovation, thus providing better business opportunity. The Open Research Data approach will facilitate, through the use of data management plans, access, re-use and preservation of research data resulting from the projects stemming from the work programme.

A Resilient Energy Union with a Forward-Looking Climate Change Policy

There is a strong political will for Europe to move towards an energy secure, competitive, climate resilient and low-carbon economy, become the world number one in renewable energies and to lead the global fight against climate change. This transition is dependent on a forward-looking multi-disciplinary climate change and energy policy that addresses the challenges and opportunities of limiting the increase in global temperature to below two degrees Celsius above pre-industrial levels up to 2050 and beyond. This transition goes hand in hand with other key political objectives, significantly enhancing energy efficiency by 2030 and beyond, ensuring affordable energy prices, reducing greenhouse gas emissions by at least 40% by 2030, increasing the security of our energy system at all levels, and increasing resilience of the energy system to climate change and ensuring its adaptation to the impacts of new consumer behaviours and energy system evolution.

Activities under this work programme will help play a major role in mobilising Europe's research excellence to generate innovative solutions, trigger additional public and private investments, to build European industrial capacities for developing supply chains that are resilient to global competition, to allow active participation of citizens, and at the same time providing a strong response against global warming and other climatic changes. The consumer must play a foremost role in all transitions to the new energy system and be provided with all necessary tools and information to keep costs at a reasonable level. Some of the main contributing activities concern:

- The **Smart and Sustainable Cities** call aims to bring together cities, industry and citizens to improve urban socio-economic functioning through sustainable integrated energy and transport solutions, and to develop business models, innovative financing modalities and appropriate governance modes for integrated solutions. Large scale demonstration projects will be launched in cities, as 'living laboratories' for deployment, testing, replication and scaling up of innovative systemic and yet locally attuned solutions and thus provide evidence for economically, socially and environmentally viable alternatives to tackle simultaneously the various challenges which cities are faced with. This will help make the EU a world leader of a new market for sustainable energy solutions.
- The call on **Energy Efficiency** will give a strong boost in research and innovation investments to remove current technological and market uptake obstacles, by addressing the most pertinent technology-related issues across the energy value chain and non-technology issues. Particular attention will be given to the building area offering the biggest potential for improvement and to improving access to finance.
- The **Competitive Low-carbon Energy** call underpins the commitment to diversify energy sources and for Europe to secure a world-leading position in renewable energies by further advancing renewable electricity and heating/cooling technologies, smart electricity grids combined with storage technologies, the integration and optimisation of the EU energy system, the development of sustainable biofuels and alternative fuels, the decarbonisation of the fossil fuel-based power sector, as well as non-technological challenges such as new financing and business models.
- Activities for moving **towards a low-carbon Europe** will aim at steering a longer-term, broad, multi-disciplinary effort to come to an authoritative view on the most favourable scenarios and options for the decarbonisation of Europe by 2050. Actions will design feasible and cost-effective technological and non-technological options of

deep decarbonisation pathways and address the consequences of those pathways with respect to the production and consumption of goods and services as well as the societal consequences and trade-offs in Europe and beyond. Support to the development of a pan-European market for cutting-edge customised climate services will enable public and private sector actors to mitigate climate risks, increase resilience, and take advantage of business opportunities. Activities within the **Blue Growth** call will also address the impact of climate change on the Arctic, and knock-on effects for Europe and beyond.

A Deeper and Fairer Internal Market with a Strengthened Industrial Base

The internal market is one of Europe's best assets in times of increasing globalisation and provides a strong basis for our companies and industry to thrive in the global economy. To reach its full potential, European industry needs to combine advanced manufacturing with sustainability and the solutions developed for societal challenges. This Work Programme will contribute to maintaining and reinforcing a strong and high-performing European industrial base and primary sector. The research and innovation activities will help maintain our global leadership in strategic sectors with high-value jobs by stimulating investment in new technologies, processes and business models, easing access to finance and up-scaling investment in the development of innovative skills. In particular, the following activities will contribute to this:

- The **Industry 2020 in the Circular Economy** call will contribute to boosting and renewing Europe's industrial capacities and the real economy, while ensuring economic, environmental and social sustainability, in the context of the circular economy, and providing the basis to the transition towards a smart, dynamic, competitive, resource-efficient and low-carbon European industrial economy. Systemic solutions will be examined, developed and demonstrated throughout value chains, while addressing all influencing factors. While the engagement of industry is essential, full societal success will depend upon a systemic approach, including new production, consumption and behaviour patterns, with strong multi-stakeholder and multi-disciplinary involvement and engagement of civil society.
- As an investment in strategies for earlier and more effective prevention, diagnosis and treatments, and for organising healthcare systems in a more efficient and sustainable way, the call on **Promoting healthy ageing and personalised healthcare** will enable the EU to better understand the determinants of health, keep its population healthier for longer, preserve quality of life, deliver better healthcare at lesser costs and provide European life sciences industries, including SMEs, with a competitive edge that can secure growth and jobs.
- In a context of growing demand for resources and competition, sustainably capturing and demonstrating the potential of seas and oceans is critical to turn this potential into an asset for Europe. In the **Blue Growth** call, targeted innovation in our seas and oceans will demonstrate the commercial application of new technologies (marine bio-refineries, deep sea mining, multi-purpose floating platforms, new medicines) while respecting sea and ocean ecosystems, and maximise synergies with activities funded at national and regional level. This has the potential to provide more jobs, growth, renewable energy sources as well as climate-smart and ecosystem solutions. Important contributions to bring technologies to readiness level for commercial applications for

the generation of renewable energy in the marine environment (tidal, wind) in potential synergy with other sectors will also be provided.

- The **Sustainable Food Security** call will address resilience and resource efficiency in the primary sectors (agriculture, forestry, fisheries and aquaculture) and in the related up- and downstream industries to ensure the food and nutritional security of EU citizens. Investments in innovation will support stability and competitiveness of the agri-food chains, such as the food industry, the largest EU manufacturing industry. This call will also help to safeguard and make efficient use of the natural capital as the basis of primary sectors, while factoring in climate and environmental challenges. Finally, the call will explore innovative approaches in the food value chain to empower citizens to change towards sustainable and healthy food consumption patterns and lifestyles.
- The **Mobility for Growth** call will contribute to further strengthening transport's role as the artery of the single market and vital contributor to EU competitiveness. It will support the world leadership of many of the Union's transport manufacturing companies, while seeking cost-effective long term solutions to key challenges, notably enhancing safety and reducing transport's dependency on fossil fuels. It will focus in particular on technology development and innovative solutions that will allow cleaner and smarter means of transport, as well as better inter-modal integration, improving the efficiency and resilience of logistics chains, and allowing greater choice to passengers. This will use ICT solutions that will in turn drive more efficient use of existing infrastructure with substantial safety improvements and energy savings.

Key enabling technologies (KETs) supporting the development of new goods, industrial processes and services as well as product-service systems, and including cross-cutting KET actions, with the potential to create unforeseen advances and new markets, will also help strengthen Europe industrial base. Calls on innovation and business opportunities in the rural sector, and bio-based innovation for sustainable goods and services will also contribute to this policy area.

Calls and activities in vital areas such as satellite navigation, earth observation and satellite communication will help Europe to reap the benefits of European investments in the space sector and in doing so stimulate smart growth and provide opportunities for highly-skilled jobs. This is a long-term challenge that requires a long-term approach that must encompass several areas such as security of supply of component technologies, industry capability and technology readiness as well as space situational awareness to cope with threats such as space orbital debris (including space surveillance and tracking).

A Stronger Global Actor, Towards a New Policy on Migration, and An Area of Justice and Fundamental Rights Based on Mutual Trust

The strong international cooperation dimension of research and innovation in Horizon 2020 will contribute to the policy area, *A Stronger Global Actor*. **International cooperation calls** and **targeted initiatives** relating to societal challenges or LEITs, developed on the basis of country/region roadmaps² and international policy dialogues with key partners, will contribute

² Report on the implementation of the strategy for international cooperation in research and innovation of 11 September 2014 – COM(2014)567 final.

to strengthening competitiveness, effectively tackling common societal challenges, supporting EU external policies, reinforcing the European presence in partner countries and boosting research and innovation cooperation. The call **Engaging together globally** will investigate major challenges to the EU's role as a global actor so as to promote the clout of the EU, make it a strong partner in its neighbourhood, and engage with global strategic partners. The Border and external security part of the **Security** call will support the Union's external security policies in its civilian tasks, ranging from civil protection to humanitarian relief, peace-keeping and post-crisis stabilisation, including conflict prevention, peace-building and mediation.

This call will also contribute to the policy area, Towards a New Policy on Migration. Europe needs to manage migration better, in all aspects, as shown by the recent events in the Mediterranean. The call will support border control authorities in their efforts to ensure the security of the EU external borders, whilst at the same time facilitating the legitimate flow of people and goods. Research will also be carried out on the origins of migrations from the EU neighbouring countries and from the 'neighbours of the neighbours'. Topics will address the increasing influence of radical movements and its impacts on asylum seeking and migration paths.

The **Reversing inequalities** call will also support the European Agenda on **Migration**. It will include a Social Platform on migration and asylum as well as a European and cross-national comparative research on migration Platform. The questions of employability, skills and labour market integration of migrants will also be addressed in this call that will cover both third country migration and internal EU migration. Evidence-based recommendations will provide insights on migration, humanitarian assistance and development cooperation policies. The significance of cultural and core values for the migration challenge will be part of the call **Understanding Europe**.

The combat against cross-border crime and terrorism is a common European responsibility. The EU needs to crack-down on organised crime, such as human trafficking, smuggling and cybercrime. The Fight against crime and terrorism part of the **Security** call, will contribute to the policy area, *An Area of Justice and Fundamental Rights Based on Mutual Trust*, by developing new technologies and innovative capabilities for fighting and preventing crime (including cyber-crime), illegal trafficking, and terrorism (including cyber-terrorism), and for understanding and tackling terrorist ideas and beliefs, while guaranteeing fundamental rights and values, including procedural rights and the protection of personal data. The call **Understanding Europe** will also contribute to this policy area by exploring the challenges to European shared values and legitimacy, its historical, educational and cultural backgrounds.

1.4 Cross-cutting and other key features

While the majority of the calls for proposals pertain to one objective of the *Specific Programme*, the Work Programme 2016-2017 also contains focus area calls covering more than one objective. Focus areas address key areas of political relevance and societal concern to provide better solutions and enhance impacts through stronger integration across different Work Programme parts, in particular between the LEITs and the societal challenges. Those calls are targeted and evidence-based, and are set to provide sufficient scale and scope to achieve a critical mass of support on the basis of clearly defined objectives and impacts. They concern the following nine calls for proposals: Internet of Things; Automated Road Transport; Digital Security; Smart and Sustainable Cities, Energy Efficiency, Competitive Low-carbon Energy, Industry 2020 in the Circular Economy; Blue Growth; and Sustainable Food Security. The calls for proposals for Internet of Things, Industry 2020 in the Circular

Economy and Smart and Sustainable Cities are in a separate Work Programme part. In addition to the priorities mentioned above, the following aspects are embedded across the whole Work Programme within the calls for proposals and activities.

Substantial support for **innovation** and close-to-markets activities such as prototyping, testing, demonstrating, piloting, large-scale product validation and market replication will be provided. Demand side approaches will be reinforced, including further support to pre-commercial procurement and public procurement for innovation in suitable areas, in particular in the societal challenges, as well as policy tools and instruments to foster the market uptake of innovations, namely regulations and standard-setting. New forms and sources of innovation will be piloted, and a broad approach to innovation reinforced with more emphasis on aspects such as process, organisational, value chain, business model innovation, user-driven innovation (including service and design), social innovation and public sector innovation.

One other important instrument to be used is **inducement prizes**. They offer a reward to the first or best solution achieving a pre-set ambitious technological and societal target. These prizes are output-oriented and can attract new talents, entrepreneurs and innovators, mobilising additional private investment for research and innovation and raising interest among the general public. At least one to two major inducement prizes are expected to be launched per year.

Further steps have been made to fully integrate Social Sciences and Humanities (SSH) in Horizon 2020 to solve complex societal challenges. Learning from the first experiences, SSH integration was addressed upstream in the strategic programming for 2016-2017 so that it becomes an integral part of the conceptual design and improves the quality of calls for proposals. It also widens the scope of the integration to cover a broader range of both social sciences and humanities to better understand and contextualise the development of certain (technological) solutions.

Horizon 2020 funded activities will support the relationships between science and society through the promotion of **Responsible Research and Innovation (RRI)** as a cross-cutting issue as well as through Part 16 of the Work Programme, '*Science with and for society*'. Included in this are actions aimed at increasing public awareness, improving the scientific knowledge base, and encouraging formal and informal science education.

The exchange of skills of artists and creative people with entrepreneurs and technologists will also be promoted. In the ICT area in particular, the STARTS (S&T&ARTS) activity will push for silo-breaking research and innovation practices via collaboration between Science and Technology and the Arts. STARTS will encourage Horizon 2020 projects to dedicate, whenever appropriate, resources to artistic and other creativity-enhancing practices for instance for exploration of technological limits via art installations, developing unexpected uses of technology, testing of unusual technical solutions, and for working on social acceptance.

All applicants are invited to explore whether and how the **gender dimension in research content** is relevant to their research, including where appropriate specific studies and training. In addition, **gender equality** is promoted in all parts of Horizon 2020 including gender balance at all levels of personnel involved in projects. Gender equality issues are also reinforced in the Excellent Science parts of the Horizon 2020 Work Programme dedicated to the ERC and MSCA.

International cooperation ensures that European partners have access to talent and resources wherever they are located; that they can tackle global societal challenges effectively; that EU companies participate in global value chains and can access new and emerging markets and helps strengthen the EU's position as a major global player. Horizon 2020 is fully open to participation of entities from across the globe, and many topics are flagged as being specifically relevant for international cooperation, identifying upfront the targeted area and partner country or region. Where appropriate financial incentives are offered to ensure that the right international partners are attracted.

The approach to **climate action and sustainable development**, in support of the 35% and 60% respective expenditure targets, has been pursued and strengthened through upfront mainstreaming during strategic programming, and then during the development of the content of the Work Programme as well as in plans for monitoring of the project implementation. Climate action and sustainable development form some of the key objectives of a number of calls under the societal challenges and LEITs.

As reflected in the **expected impact statements** of the calls for proposals, impact together with excellence are important elements of the Work Programme. Clearer and stronger expected impacts are an important aspect of the presentation of the Work Programme. Where appropriate, this includes aspects such as business potential, service orientation, understanding of user and customer needs, and skills development.

Also important are the **potential synergies with European Structural and Investment Funds (ESIF)** which will be promoted. The European Structural and Investment Funds (ESIF) will invest some €90 billion in innovation and research in the period 2014-2020 and therefore, Art. 20 of the Horizon 2020 Regulation and Article 37 Rules for Participation encourage **synergies between Horizon 2020 and other European Union funds, such as ESIF.**

Synergy aims to strengthen the impact of both Horizon 2020 and ESIF funds. Examples could be the development and equipment of research and innovation infrastructures, or the fostering of innovation skills through ESIF that enable the participation in a Horizon 2020 project, or the transfer of knowledge and technologies resulting from Horizon 2020 projects to firms that can, through ESIF funding develop it further, test, prototype, etc. ESIF can also be used to expand the support and advisory services for potential Horizon 2020 participants, or help deploy innovative solutions emanating from Horizon 2020, e.g. through public procurement in the fields of environment, transport, health and energy.

Applicants are invited to identify the smart specialisation fields of their EU Member State or region (see: <http://s3platform.jrc.ec.europa.eu/eye-ris3>) and explore the potential for synergies with the relevant Managing Authorities in charge of the ESIF in their territory (see: http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm).

Horizon 2020 enables EU-wide competition to select the best proposals, thereby raising levels of excellence and providing visibility for leading research and innovation. The European Structural and Investment Funds (ESIF) could for example support those project proposals evaluated as excellent but which could not be funded because of insufficient Horizon 2020 budget, whenever in line with ESIF smart specialisation priorities and Cohesion/national rules. To facilitate this process, a 'Seal of excellence' was provided as of November 2015 to above-threshold, not-funded proposals under the SME instrument.

This action will be complemented by a strong 'mobilisation' campaign towards regions/countries (through the established Community of Practice) to include funding schemes that would be 'Seal-of-Excellence-friendly' in implementing their ESIF co-funded

Operational Programmes (meaning that they would create favourable conditions for those proposals that had been already granted a 'Seal of Excellence' by the Commission services)."

Under Horizon 2020, the **evaluation and monitoring of research and innovation activities** will continue to be of instrumental importance, ensuring that the programme implementation is performant to achieve its objectives and maximises Union added value and impact.

1.5 Communication, open access to research results and a new emphasis on data management

This Work Programme continues the new approach under Horizon 2020 to communication and to access provided to research results and to data management.

First, actions shall develop and implement a comprehensive communication plan to ensure a high visibility of the funded actions and help to maximise the impact of results.

1.5.1. Open access to scientific peer reviewed publications

Second, as in previous Work Programmes, and following the policy outlined in the Horizon 2020 Regulation and the provisions of the Model Grant Agreement (article 29.2.) , beneficiaries must ensure that *peer-reviewed scientific publications* resulting from Horizon 2020 are made open access i.e. that free of charge online access for the user is provided. Beneficiaries must also aim to deposit the publication in a repository and must also aim to *deposit* at the same time the research data needed to validate the results presented in scientific publications. Further information on the Open Access in Horizon 2020 is made available on the Participant Portal.

15.2. Open access to research data and research data management

Third, a novelty in Horizon 2020 is the *Open Research Data Pilot* (ORD pilot) which aims to improve and maximise access to and re-use of research data generated by projects. As of the Work Programme 2017 this ORD pilot is being extended to cover *all thematic areas of Horizon 2020* in order to "make open research data the default option", as announced in the Communication 'a European Cloud Initiative – Building a competitive data and knowledge economy in Europe'. This is indicated in the introduction of the thematic work programmes³ Otherwise the setup of the ORD pilot remains the same and is described in Article 29.3 of the Horizon 2020 Model Grant Agreement(s) or its equivalent.

The Open Research Data Pilot applies to the data needed to validate the results presented in scientific publications. Additionally, projects can chose to make other data available for open access and need to describe their approach in a Data Management Plan (DMP, see below).

As stipulated in the Horizon 2020 Rules for Participation (Regulation No 1290/2013 of the European Parliament and of the Council of 11 December 2013) the Commission takes into consideration the legitimate interests of the participants and any constraints pertaining to data

³ Note that some *instruments* are excluded, namely those co-fund actions that do not produce data, prizes, ERC proof of concept instruments, and the SME instrument Phase I.

protection rules, security rules or intellectual property rights. It provides robust possibilities for projects to partially or entirely opt-out of open access to research data before or after⁴ the signature of the grant agreement (see general annex L).

It needs to be stressed that in the evaluation phase, proposals will **not** be evaluated more favourably because they engage in data sharing, and will not be penalised for opting out.

Participating projects will receive dedicated support. In particular, any costs related to open access to research data and related data management and data sharing costs (including the creation of a DMP) will be reimbursed and specific technical and professional support services will be provided.

Further information on research data sharing is made available on the Participant Portal.

Fourth, a further new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. Ideally, the DMP should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable.

The use of a Data Management Plan is required for all Horizon 2020 projects, except if they opt-out of sharing their research data for one of the reasons indicated in general annex L. Note that a DMP is **not** required at submission stage. Rather, projects must provide a first version of the DMP within the first six months of the project (as a deliverable), to be updated as appropriate. Further information on Data Management Plans is made available on the Participant Portal.

The open access mandate as well as the policy on data management plans will be reviewed in the context of the Horizon 2020 Interim evaluation which is due to be completed before the end of 2017.

Horizon 2020 may contribute financially to corporate communication in 2016 in accordance with article 28 of the Regulation establishing the Programme. This contribution would cover the corporate communication of the Union's political priorities to the extent that they are related to the general objective of the Programme

1.6 Complementarity with other Work Programmes

Complementing this Work Programme are the direct research activities carried out by the Joint Research Centre through its own Work Programme, the indirect actions of the Euratom Programme and of the ERC, the joint actions of the Public-Public Partnerships (P2Ps), and the work of the European Institute of Innovation and Technology (EIT) in its efforts to build Knowledge and Innovation Communities (KICs).

1.7 Key websites

The key websites to help those submitting proposals for Horizon 2020 funding and for information are:

⁴ Once the project has started, opt-outs are possible via an amendment (to remove article 29.3. of the grant agreement) or by explaining why datasets are kept closed in the Data Management Plan. The latter is preferable, since it is a more flexible approach.

- the Participant Portal (incorporates a powerful search facility for the Work Programme) at <http://ec.europa.eu/research/participants/portal/desktop/en/home.html>
- Participant Portal Glossary
http://ec.europa.eu/research/participants/portal/desktop/en/support/reference_terms.html
- the Horizon 2020 site on Europa at <http://ec.europa.eu/programmes/horizon2020/>
- the Community Research and Development and Information Service (CORDIS) at <http://cordis.europa.eu/>