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Horizon 2020: Commission proposes €80 billion investment in research and innovation, to boost growth and jobs

The European Commission has presented an €80 billion¹ package for research and innovation funding, as part of the drive to create sustainable growth and new jobs in Europe. The new programme, "Horizon 2020" will make it easier for applicants to seek funding and is designed to help bring more good ideas to market. Horizon 2020 will run from 2014 to 2020.

Horizon 2020 brings together all EU research and innovation funding

Horizon 2020 will bring together all existing EU research and innovation funding currently provided through the Framework Programme for Research and Technological Development (FP), the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT). The different types of funding provided by the existing programmes will be brought together into a single coherent, flexible framework which will run from 2014 to 2020. It will provide funding for every stage of the innovation process from basic research to market uptake, in line with the EU's commitments under the "Innovation Union".

Horizon 2020 will be complemented by further measures to complete the European Research Area by 2014 ([IP/11/1025](#), [MEMO/11/597](#)). These measures will aim at breaking down barriers to create a genuine single market for knowledge, research and innovation.

¹ Constant 2011 prices. €90billion taking account of estimated inflation 2014-2020.

Horizon 2020 - new programme architecture

EU funding for research and innovation will be focused on three strategic objectives, implemented through specific programmes and a dedicated financial contribution to the EIT.

The first objective is dedicated to supporting an 'Excellent science' in Europe. A budget of €24.6 billion will strengthen the EU's position as a world leader in science. This will include:

- €13.2 billion for the highly successful European Research Council (ERC), which provides substantial grants to top-level individual researchers working in Europe.
- Investment of €3.1 billion in future and emerging technologies (FET) to open up new fields of research and innovation.
- A budget of €5.75 billion for the Marie Curie Actions to develop research and innovation skills through the training, mobility and career development of researchers.
- Funding of €2.4 billion will also be available for supporting access to, and networking of priority research infrastructures across Europe.

The second objective, 'Industrial leadership', with a budget of €17.9 billion, will help make Europe a more attractive location to invest in research and innovation. It will include major investments in key industrial technologies such as Information and Communication Technologies (ICT), nanotechnologies, biotechnology and space (total of €13.7 billion). It will facilitate access to risk finance, which has a high leverage on private investment and has been shown to be a very valuable tool in fighting the lack of risk capital following the financial crisis (Dedicated budget of €3.5 billion). It will also provide EU-wide support for innovation in SMEs with high growth potential.

The third objective, 'Societal challenges' will see €31.7 billion allocated to tackling the major issues affecting the lives of European citizens. The focus will be on six key areas:

- Health, demographic change and well-being;
- Food security, sustainable agriculture, marine and maritime research and the bio-based economy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, resource efficiency and raw materials;
- Inclusive, innovative and secure societies.

The goal will be more than ever to bring excellent research results to market. This will deliver direct benefits to citizens, such as affordable health-care, protection against cyber-crime, and the transition to a resource-efficient, low-carbon economy.

Cutting red tape

Horizon 2020 has been built around radically simplified rules and procedures to attract more top researchers and a broader range of innovative enterprises. This includes:

- a more transparent programme architecture;
- a single set of rules for participation, including on eligibility for funding, evaluation and IPR;
- drastically simplified reimbursement by introducing a single flat rate for indirect costs and only two funding rates - for research and for close to market activities respectively;
- streamlined funding rules, for instance allowing the use of researchers' own accounting methods;
- fewer controls and audits, but without compromising the sound financial management of EU funds as simplified procedures for participation mean less error;
- earlier project starts.

Strengthening innovation

If European industry is to remain competitive, it needs to bring more products and services from the drawing board onto the market. Horizon 2020 aims to provide support for this process not only by supporting research and technological development, but also by building on EU strengths in design, creativity, services and social innovation. Non-technological innovation can take place in all parts of Horizon 2020. Regarding social innovation, the 'Inclusive, innovative and secure societies' challenge contains a specific objective on 'social innovation and creativity'.

Horizon 2020 will strengthen innovation by:

- acting on the supply side by increasing support for activities which are closer to market
- Acting on the demand side by, for example developing specifications for new standards, or supporting public bodies to procure R&D services or innovative products and services.
- introducing inducement prizes
- Strengthening bottom-up activities, allowing Europe's brightest and most creative minds to propose their own solutions
- introducing a new SME instrument specifically designed to help SMEs innovate
- scaling up financial instruments in which the public sector shares the risk with the private sector

Reversing the brain drain

Horizon 2020 will attract talent from around the world and retain great researchers in Europe by building on initiatives to boost Europe's research and innovation facilities and performance.

The European Research Council (ERC) will increase efforts to attract top research talent from outside Europe. This body is already helping to retain and attract leading researchers who might otherwise have pursued their careers in the US or elsewhere. For example, two-thirds of the ERC's grant-holders in neurosciences have had post-doctoral experience in the US; and, half of the ERC's economics grant-holders completed their PhD in the US.

This will be complemented by funding for the Future and Emerging Technologies (FET) which promotes research co-operation across disciplinary boundaries. Supporting innovation in the most promising emerging areas of technology, and creating cross-national communities of knowledge, will extend Europe's capacity for advanced and paradigm-changing innovation.

Marie Curie Actions (MCA) promote intersectoral and international mobility and knowledge-sharing. They equip researchers with entrepreneurial and innovation skills for the labour market. By attracting non-European researchers, they enhance international cooperation.

The research career portal EURAXESS helps researchers find attractive careers in Europe. The portal announces vacancies in universities and companies and has a network of more than 300 public and private centres.

Closing the research and innovation divide in Europe

There are significant regional disparities across Europe in research and innovation performance, which need to be addressed. Horizon 2020 will allocate funding based on excellence, regardless of geographical location, but will increasing focus on identifying excellence across Europe. Cohesion policy funds will focus on research and innovation capacity building through pre-allocated envelopes for eligible regions.

Specific measures will include:

- Recognising excellence in less developed regions and creating links between researchers there with leading counterparts elsewhere in Europe. This includes twinning, staff exchanges, expert advice and assistance and the development of joint strategies for the establishment of centres of excellence, which may be supported by the Cohesion policy funds in less developed regions.
- Establishing 'ERA Chairs' to attract outstanding academics to institutions with a clear potential for research excellence. This would help create a level playing field for research and innovation in the European Research Area (ERA).
- Supporting access to international networks for excellent researchers and innovators who are not yet sufficiently involved in European and international networks.
- Supporting the development and monitoring of 'smart specialisation' strategies. A policy support facility will be developed and policy learning at regional level be facilitated through international evaluation by peers and best practice sharing.

Developing industrial leadership and competitiveness, including for SMEs

One of the key objectives of Horizon 2020 is to increase industrial leadership in innovation, to raise competitiveness and bring more good ideas to market. Some key initiatives will be:

- Building leadership in enabling and industrial technologies, with dedicated funding support of €13.78 billion for ICT, including photonics and micro- and nanoelectronics, nanotechnologies, advanced materials, advanced manufacturing and processing, biotechnology, and space.
- €3.5 billion will be devoted to scaled up and expanded use of financial instruments to help leverage yet further private research and innovation investments, including venture capital investments for innovative, high-tech companies, and in particular SMEs. For every Euro invested in this way, up to €5 in additional financing will be generated. This will be achieved through two financial instruments:
 - A **debt facility** providing loans and guarantees and other forms of debt/ risk finance to entities of all forms and sizes, including research and innovation-driven SMEs
 - An **equity facility** will focus on early stage investments while having the possibility to make expansion and growth-stage investments in conjunction with the equity facility under the Programme for the Competitiveness of Enterprises and SMEs.

Both financial instruments will support the achievement of the R&I objectives of all sectors and policy areas crucial for societal challenges, enhancing innovation and fostering sustainable growth. They will be implemented via a mandate to or a partnership with, the European Investment Bank group and/or other international financial institutions and national intermediaries. A specific facility for SMEs will start up in early 2012.

- SME participation across Horizon 2020 based on an integrated strategy that aims to fill gaps in funding for early-stage, high-risk research and innovation by SMEs as well as stimulating breakthrough innovations. Around 15% (€6.8 billion) of the total combined budgets of the 'Societal challenges' Specific Programme and the 'Leadership in enabling and industrial technologies' objective will be devoted to SMEs.
- A new dedicated SME instrument (similar to the SBIR model in the United States) will provide an easily accessible SME window, with simple rules and procedures. The new instrument will encourage SMEs to put forward their most innovative ideas with an EU dimension. Only SMEs will be able to apply for funding, even single company support will be possible to ensure market relevance and to increase commercialisation of project results.
- In addition, a specific action will promote market-oriented innovation of R&D-performing SMEs, building on the Eurostars Joint Programme. Furthermore, SMEs will be encouraged to participate in other parts of Horizon 2020.

Information and Communications Technologies in Horizon 2020

As a whole, the information and communication technologies (ICT) sector represents 4.8% of the EU economy. It generates 25% of total business expenditure in Research and Development (R&D), and investments in ICT account for 50% of all European productivity growth.

The overall aim of EU research and innovation in information and communication (ICTs) under Horizon 2020 is to bring the benefits of progress in these technologies to European citizens and businesses. ICT is essential to address Europe's societal challenges. It brings unique responses e.g. to the growing needs for sustainable healthcare and ageing well, for better security and privacy, for a lower carbon economy and for intelligent transport.

This EU investment will support the ICT research and innovation that can best deliver new business breakthroughs, often on the basis of emerging technologies.

In particular, ICT in Horizon 2020 will support the development of:

ICT in Science

- FET Open fostering novel ideas: Collaborative research for embryonic, high risk visionary science and technology
- FET Proactive: Nurturing emerging themes and communities
- FET Flagships: projects on a global scale tackling grand interdisciplinary science and technology challenges
- E-Infrastructures: Integration and access to national research infrastructures; development, deployment and operation of e-Infrastructures

ICT in industrial leadership

- Developing new generation of components and systems including smart embedded components and systems, micro-nano-bio systems, organic electronics and complex systems engineering.
- Next generation computing, Advanced computing systems and technologies.
- Network infrastructures, technologies and services for the future Internet,
- Content technologies and information management, including ICT for digital content and creativity. Advanced interfaces and robots. Service robotics, cognitive systems, advanced interfaces and smart spaces.
- Key Enabling Technologies: Micro- nano-electronics and photonics. Development of these technologies requires a multi-disciplinary, knowledge and capital-intensive approach.

ICT in societal challenges

- Health, demographic change & wellbeing; e-health, self management of health, improved diagnostics, improved surveillance, health data collection, active ageing, assisted living;
- Secure, clean and efficient energy; Smart cities; Energy efficient buildings; smart electricity grids; smart metering;
- Smart, green and integrated transport; Smart transport equipment, infrastructures and services; innovative transport management systems; safety aspects
- Climate action, resource efficiency and raw materials; ICT for increased resource efficiency; earth observation and monitoring
- Inclusive, innovative and secure societies; Digital inclusion; social innovation platforms; e-government services; e-skills and e-learning; e-culture; cyber security; ensuring privacy and protection of human rights on-line

Socio-economic sciences and humanities in Horizon 2020

The social sciences and humanities will be fully integrated within each of the main pillars of Horizon 2020. In particular, the "Inclusive, Innovative and Secure Society" challenge will allow the social sciences and humanities scientific community to study issues such as smart and sustainable growth; social transformations in European societies; social innovation and creativity; the position of Europe as a global actor, as well as the social dimension of a secure society. Social sciences and humanities researchers can also receive funding via the European Research Council, Marie Curie Action and initiatives under the Research Infrastructures Programme.

The European Institute of Innovation and Technology (EIT)

The European Institute of Innovation and Technology (EIT) is an autonomous EU body stimulating world-leading innovation. The EIT has an administrative headquarters (in Budapest) and its KICs operate from 16 sites throughout Europe, bringing together excellent higher education institutions, research centres and businesses. To date, three KICs have been created, focusing on sustainable energy (InnoEnergy KIC), climate change (Climate KIC) and information and communication society (EIT ICT Labs).

Under Horizon 2020, the EIT will consolidate and enhance the impact of the three existing KICs and gradually set up six additional KICs until 2020 in areas of major societal and economic relevance, with a high innovation potential –added value manufacturing, food4future, innovation for healthy living and active ageing, raw materials, smart secure societies, and urban mobility. It also plans to install mechanisms ensuring that best practices from the KICs are fully shared and accessible across Europe. Through the proposed measures, the EIT is expected to provide impulse for creating up to 600 start-up companies and for training around 25.000 students and 10.000 PhDs in new curricula combining excellent science with a strong entrepreneurship component.

The European Research Council

Set up in 2007 by the EU, the European Research Council is the first pan-European funding organisation for frontier research. It aims to stimulate scientific excellence in Europe by encouraging competition for funding between the very best, creative researchers of any nationality, age and theme. The ERC's two core funding schemes are the 'ERC Starting Grants' (worth up to €2 million over up to 5 years) for younger, early-career top researchers, and the 'ERC Advanced Grants' (worth up to €3.5 million over up to 5 years) for senior research leaders.

To date, the ERC has funded over 2,200 frontier research projects throughout Europe and has become a "benchmark" of the competitiveness of national innovation systems as it complements existing funding schemes at national and European levels. In addition to retaining and attracting the best talent, each ERC grants on average allows the lead researcher to employ four other researchers, contributing to the training of a new generation of excellent scientists.

Under Horizon 2020 the ERC will receive €13.2 billion over seven years.

The Joint Research Centre

The Joint Research Centre (JRC) is the in-house science service of the European Commission. Its mission is to provide scientific and technical support to EU policy making, thus operating at the interface between research and EU policy. It provides input throughout the whole policy cycle from conception to implementation and evaluation, on key priority areas: energy and transport, environment and climate change, agriculture and food security, health and consumer protection, information and communication technologies, reference materials, and all aspects of safety and security including nuclear.

It will contribute to provide independent and sound scientific input to evidence-based policy making and thus underpins Europe's development towards smart, sustainable and inclusive growth. JRC research will complement other Horizon 2020 funded research activities in finding answers to the economic and societal challenges faced by Europe today.

More public-private and public-public partnerships

European Innovation Partnerships are a new way to join up resources to accelerate breakthrough innovations for societal challenges where there is also a new market potential for EU business.

EIPs are not funding instruments, nor do they substitute the existing institutional decision mechanisms. However, the objectives developed in the EIPs' Strategic Implementation Plans are key contributions to the definition of priorities in the annual work programmes of Horizon 2020, with obligations on both sides (the Commission and the EIP itself) to ensure dialogue and follow-up on proposed priorities.

The Commission will also support Joint Programming Initiatives (JPIs) during the development of their Strategic Research Agendas through co-ordination and support measures. Where the areas addressed by a JPI fit with Horizon 2020 priorities, its instruments may be used to support JPIs where appropriate. In general, JPI joint actions will be evaluated on a case-by-case basis to assess whether the EU value-added justifies funding via the ERA-NET scheme or co-funding via thematic research calls.

"Article 185 Initiatives" (Article 185 of the Treaty on the Functioning of the European Union – TFEU) enable the Union to participate financially in research programmes undertaken jointly by several Member States, including participation in the structures created for the execution of national programmes. An example of this is the "Eurostars" programme for SMEs implemented by the Eureka secretariat. The Commission will only consider making a proposal for an Article 185 Initiative where a JPI has demonstrated in its Strategic Research Agenda that it has the capacity for significant collaboration and the necessary scale and scope to support full integration of national programmes.

Promoting gender equality and the gender dimension in research and innovation

Horizon 2020, takes on the EU's overall mission to eliminate inequalities and to promote equality between men and women. This implies the following dual approach:

- To correct the imbalances in the participation of female scientists at all stages of research careers and in the various fields of research;
- To consider gender as a dimension of research by taking into account the biological, social and economic differences between women and men all through the research process.

Each work programme will contain a dedicated section describing the action planned to address imbalances between the sexes, and to integrate a gender dimension. This will also be reflected at project level within the provisions of grant agreements.

Promoting responsible research and innovation in Horizon 2020

There is often a major gap in time between ground breaking research being conducted and the point at which innovative products or systems based on this research are regularly used by EU citizens and businesses. This engenders the risk that future public concerns (for example privacy concerns related to the internet, or ethical concerns over GMOs) which were not imagined by policy makers or researchers at the time, could hamper development or the take up of fruits of innovative research innovation.

To overcome this, and to deepen the relationship between science and society and reinforcing public confidence in science, Horizon 2020 will favour an informed engagement of citizens and civil society on research and innovation matters by promoting science education, by making scientific knowledge more accessible, by developing responsible research and innovation agendas that meet citizens' and civil society's concerns and expectations and by facilitating their participation in Horizon 2020 activities.

The existing research funding architecture

Horizon 2020 will bring together all existing EU research and innovation funding currently provided through the Framework Programme for Research and Technological Development (FP), the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT).

- The framework programmes are seven year programmes where grants are given to researchers all over Europe and beyond, in order to co-finance research, technological development and demonstration projects. Grants are determined on the basis of calls for proposals and a peer review process, which are highly competitive. The current seventh framework programme, FP7, runs from 2007–2013 with a total budget of €55 billion.
- The current CIP runs from 2007 to 2013 with an overall budget of €3.6 billion. It targets mainly small and medium-sized enterprises (SMEs) and supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions. It encourages a better take-up and use of information and communication technologies (ICT) and helps to develop the information society. It also promotes the increased use of renewable energies and energy efficiency.
- The EIT is an institute of the European Union established in March 2008. Its mission is to integrate the knowledge triangle of research, innovation and education and thus to reinforce the Union's innovation capacity. It aims to achieve this objective through the pioneering concept of highly integrated cross-border public-partnerships known as Knowledge and Innovation Communities (KICs), in areas of societal challenges that are of utmost relevance to Europe's common future.