European Commission

Strategic Plan 2016-2020

Directorate-General for Research and Innovation

*The current Commission's term of office runs until 31 October 2019. New political orientations provided by the incoming Commission for the subsequent period will be appropriately reflected in the strategic planning process.

Contents

PART 1. Strategic vision for 2016-2020

A. Mission statement

The Directorate-General for Research and Innovation defines and implements European Research and Innovation (R&I) policy with a view to reinforcing the science and technology base, spurring innovation and turning societal challenges into innovation opportunities that will help deliver on the European Commission priorities.

The DG contributes to the Commission's priorities for growth, jobs and investment, the Digital Single Market, the Energy Union and global action.

Improving research and innovation in Europe requires action to achieve:

- Open Innovation – helping Europe to capitalise on the results of research and innovation and create shared economic and social value by bringing more actors into the innovation process, boosting investment, maximising the impact of innovation and creating the right innovation ecosystems.
- Open Science – supporting new ways of doing research and diffusing knowledge by using digital technologies and new collaborative tools, to ensure excellent science and open access to data and results, so that Europe benefits from digital technologies to drive innovation
- Open to the World - fostering international cooperation so that the EU's strengths in research and innovation help us tackle global societal challenges effectively, create business opportunities in new and emerging markets, and use science diplomacy as an influential instrument of external policy

Horizon 2020, the Framework Programme for Research and Innovation (2014-2020), is designed to support research in Europe and deliver on European research and innovation policy objectives.

B. Operating context

Competences of the European Union

According to the Treaty on the Functioning of the European Union (TFEU), the competences of the European Union in the area of Research and Technological Development are shared with the Member States. Specifically, in Article 4.3 of the TFEU, it is mentioned: "... in the areas of research, technological development and space, the Union has competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs".

Treaty obligations relevant to DG Research and Innovation

The obligations of DG Research and Innovation are set out in Chapter XIX of the Treaty on the Functioning of the European Union (TFEU) and Title II, Chapter 1 of the Euratom Treaty.

Specifically, according to Article 179, "the Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties".

In pursuing this objective, the Union shall carry out the following activities, complementing the activities carried out in the Member States (Article 180):

a) Implementation of research, technological development and demonstration programmes, by promoting cooperation with and between undertakings, research centres and universities;
b) Promotion of cooperation in the field of Union research, technological development and demonstration with third countries and international organisations;
c) Dissemination and optimisation of the results of activities in Union research, technological development and demonstration;
d) Stimulation of the training and mobility of researchers in the Union.

In Article 181 it is mentioned that the "…Union and the Member States shall coordinate their research and technological development activities so as to ensure that national policies and Union policy are mutually consistent".

Articles 182-186 specify the details of the multiannual framework programme, which sets out all the activities of the Union and which is adopted by the European Parliament and the Council. Article 185 states that "…In implementing the multiannual framework programme, the Union may make provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes".

Furthermore, according to Article 187 "...The Union may set up joint undertakings or any other structure necessary for the efficient execution of Union research, technological development and demonstration programmes".

Regarding obligations stemming from the Euratom Treaty, according to Article 4, "the Commission shall be responsible for promoting and facilitating nuclear research in the Member States and for complementing it by carrying out a Community research and training programme".

The TFEU underlines that the role of research and innovation needs to be seen holistically, and is not limited to a framework programme. Although Horizon 2020 is Europe's largest single research and innovation programme, it accounts for only a very small proportion of the public research and innovation effort in Europe. The headline indicator of 3% R&I expenditure fixed in the Europe 2020 strategy is made up of:

- 1% public expenditure (of which Horizon 2020 is a minority);
- 2% private expenditure.

To have any chance of progressing to this goal, efforts therefore need to go well beyond the effective implementation of the Framework Programme. This is also needed to address the challenges of ensuring a competitive industrial and technological base, and an effective coordination of Member States policies.

<u>Types of the Commission's interventions</u>

The types of the DG RTD interventions are:

- Definition and implementation of European Research and Innovation (R&I) policy;
- Analysis of national R&I policies and efforts to increase the effectiveness and efficiency of research and innovation systems in Europe through more R&I investment with higher impact, and coordination with Member States in order to achieve the European Research Area;

- Efforts to establish framework conditions that foster and support R&I based on an analysis of potential barriers to effective R&I in Europe;
- Contribution to resolving specific challenges facing society, especially in the area of realising the full potential of digital technologies, energy and climate change;
- Launching of international agreements and initiatives as well as promotion of international cooperation with International Partner Countries and International Organisations;
- Management of funding programmes (i.e. Horizon 2020, Euratom, RFCS, FP7 legacy).

Management modes

DG RTD has fully implemented the principles pursued by the Commission for the Multiannual Financial Framework (MFF) 2014-2020, i.e. better use of human resources, focusing on core institutional tasks and guaranteeing the most effective and efficient implementation of spending programmes for which it remains ultimately responsible.

The DG is continuously strengthening its role as a policy-oriented DG. In addition to defining and implementing European Research and Innovation (R&I) policy and contributing to the European Semester by analysing national R&I policies and formulating country specific recommendations where necessary, it carries out Horizon 2020 policy-related activities (e.g. definition of work programmes, coordination of the Research family of DGs, providing scientific support and evidence for evidence based policy making to other areas, contribution to EU external action priorities, etc.). At the same time, it has reduced its direct involvement in contract management (e.g. calls, contract finalisation, payments, etc.). Following the positive experience from the Seventh Framework Programme (FP7), which saw the establishment of two Executive Agencies and the launch of the first Joint Undertakings, many of the implementation functions related to Horizon 2020 (and around 65% of the budget) have now been delegated to New Management Modes.

In practical terms “New Management Modes” are translated into a number of distinct structures created by the Commission (Executive Agencies – EAs) or in cooperation with industry (Joint Undertakings – JUs). Though separate legal entities, they are bound to the common objectives through legal means (Council Regulations or Establishment and Delegation Acts), political and budgetary arrangements (they implement parts of the Union budget and are accountable to the College or to the Parliament) and internal management arrangements put in place to monitor and supervise their activities.

Four Executive Agencies are part of the Research family: the Executive Agency for Small and Medium-sized Enterprises (EASME), the European Research Council Executive Agency (ERCEA), the Innovation and Networks Executive Agency (INEA) and the Research Executive Agency (REA). DG Research and Innovation is the leading partner DG, and as such is chairing the Steering Committee, of two Executive Agencies, ERCEA and REA.

Joint Undertakings are bodies set up together with partners in the private sector in order to develop and implement a specific Joint Technology Initiative. Joint Technology Initiatives (JTIs) provide a way of creating new partnerships between publicly and privately-funded organisations involved in research, focussing on areas where research and technological development can contribute to European competitiveness and quality of life. The approach proposed by the JTIs signals a real change in how Europe promotes industry-driven research, designed to establish European leadership in certain technologies that are strategic to Europe's future. Ownership of JUs is shared and the Commission has its own members in the Governing Board of each JU. DG Research and Innovation is responsible for four bodies based on Article 187 TFEU (Joint Undertakings):

- The Bio-Based Industries Joint Undertaking (BBI) - Societal Challenge "Food" and Enabling and industrial technologies “Biotechnology” (total EU contribution up to €975 million);
- The Innovative Medicines Initiative 2 (IMI2) - Societal Challenge "Health" (total EU contribution up to €1,638 million);

- The Fuel Cells and Hydrogen 2 Joint Undertaking FCH2) - Societal Challenges "Energy" and "Transport" (total EU contribution up to €665 million in total);
- The Clean Sky 2 Joint Undertaking - Societal Challenge "Transport" (total EU contribution up to €1755 million).

DG Research and Innovation also contributes to the Joint Undertaking Shift2Rail (for which DG MOVE is the lead service).

In addition to the two types of externalised bodies already mentioned, the Commission participates in the so called Article 185 initiatives - named after the Treaty article that enables the Union to participate in these research programmes. They are Public-Public partnerships, established between the Commission on one side and various national research and development programmes managed by participating Member States on the other. The main objective of the coordination of national research programmes is to reduce the fragmentation and duplication of research efforts carried out at national or regional level in Europe. DG Research and Innovation oversees four such partnerships, three of which were renewed in April 2014, for a total EU contribution of up to €1.270 million:

- European and Developing Countries Clinical Trials Partnership (EDCTP 2) - Societal Challenge Health (EU contribution up to €683 million);
- Eurostars 2, dedicated to R&D performing SMEs (EU contribution up to €287 million);
- The European Metrology Programme for Research and Innovation (EMPIR) (EU contribution up to €300 million);
- The BONUS initiative which integrates the Baltic Sea research system into a long-term, cooperative, interdisciplinary and focused multinational programme in support of the regions sustainable development.

Between 2014 and 2020, New Management Modes are expected to implement 65% of the Horizon 2020 budget (EAs 55% and JUs 10%).

Key stakeholders

Internal stakeholders

- The Research family DGs (DG AGRI, DG CNECT, DG EAC, DG ENER, DG GROW, DG HOME, DG MOVE, DG JRC), which develop policies that support or complement DG Research and Innovation policies;
- Other DGs that need an evidence-base from research for their own policy development;
- Other DGs with which we implement jointly EU international agreements and external policies (e.g. EEAS, DG NEAR, DG DEVCO, DG GROW, DG HOME, DG EAC, DG TRADE);
- The four Executive Agencies that are part of the Research family, which implement parts of Horizon 2020;
- The Joint Undertakings, which bring together the public and private sector to leverage funds and achieve critical mass;
- The Public-Public partnerships, which benefit from a greater coordination and less fragmentation and duplication.

External stakeholders

- The European Parliament and the Council, which together constitute the legislative authority, which enacts the Framework Programmes, and the budget authority, which oversees the expenditure related to the Framework Programmes;
- The Member States and their national research systems, which benefit from a greater coordination in research efforts, and less fragmentation and duplication;
- The research community (academics, research performing organisations, research funding organisations), which supports and performs the research and retains important research capacity in Europe;

- The private sector (industry and companies, in particular SMEs), which brings scientific breakthroughs to the market and contributes to research financing;
- Intersectoral organisations and expert groups, which provide expert advice to the Commission;
- Citizens and civil society organisations;
- International Partner Countries and International Organisations.

C. Strategy

C.1 Commission general objectives to which the DG Research and Innovation contributes

Research, science and innovation are core pillars of the Europe 2020 strategy and among the priority areas for additional investment through the Jobs, Growth, and Investment Package that President Juncker has committed himself to. DG Research and Innovation will contribute first and foremost to the Jobs, Growth and Investment priority of this package, but it also makes a crucial contribution to the achievement of other priorities, especially the Digital Single Market, a Resilient Energy Union, and the EU as a Stronger Global Actor.

DG Research and Innovation does so by taking initiatives that boost European research and innovation and optimise its impact, in particular those initiatives that increase the effectiveness and efficiency of Europe's research and innovation systems through more R&I investment with higher impact and the achievement of the European Research Area, and that improve the framework conditions for research and innovation in Europe and with International Partner Countries.

Impact indicators

<table>
<tr><td colspan="4">General objective: A New Boost for Jobs, Growth and Investment</td></tr>
<tr><td colspan="4">Impact indicator: Percentage of EU GDP invested in R&D (combined public and private investment)
Source of the data: Eurostat</td></tr>
<tr><td colspan="2">Baseline
(2012)</td><td colspan="2">Target
(2020)
Europe 2020 target</td></tr>
<tr><td colspan="2">2.01%</td><td colspan="2">3%</td></tr>
<tr><td colspan="4">General objective: A Connected Digital Single Market</td></tr>
<tr><td colspan="4">Impact indicator: Aggregate score in Digital Economy and Society Index (DESI) EU-28
Explanation: DESI is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. The closer the value is to 1, the better. The DESI index is calculated as the weighted average of the five main DESI dimensions: 1 Connectivity (25%), 2 Human Capital (25%), 3 Use of Internet (15%), 4 Integration of Digital Technology (20%) and 5 Digital Public Services (15%).
Source of the data: DESI</td></tr>
<tr><td colspan="2">Baseline
(2015)</td><td colspan="2">Target
(2020)</td></tr>
<tr><td colspan="2">0.478</td><td colspan="2">Increase</td></tr>
<tr><td colspan="4">General objective: A Resilient Energy Union with a Forward-Looking Climate Change Policy</td></tr>
<tr><td colspan="4">Impact indicator: Greenhouse gas emissions
(index 1990=100)
Source of the data: European Environmental Agency</td></tr>
<tr><td colspan="2">Baseline
(2013)</td><td colspan="2">Target
(2020)
Europe 2020 target</td></tr>
<tr><td colspan="2">80.2</td><td colspan="2">At least 20% reduction (index ≤80)</td></tr>
<tr><td colspan="4">Impact indicator: Share of renewable energy in gross final energy consumption
Source of the data: Eurostat</td></tr>
<tr><td rowspan="2">Baseline
(2013)</td><td colspan="2">Interim Milestone</td><td rowspan="2">Target
(2020)
Europe 2020 target</td></tr>
<tr><td>(2015/2016)</td><td>(2017/2018)</td></tr>
<tr><td>15%</td><td>13.6%</td><td>15.9%</td><td>20%</td></tr>
<tr><td colspan="4">Impact indicator: Increase in energy efficiency – Primary energy consumption
Source of the data: Eurostat</td></tr>
</table>

Baseline (2013)	**Target** (2020) Europe 2020 target
1 566.5 million tonnes of oil equivalent (Mtoe)	20% increase in energy efficiency (No more than 1 483 Mtoe of primary energy consumption)
Impact indicator: Increase in energy efficiency – Final energy consumption **Source of the data**: Eurostat	
Baseline (2013)	**Target** (2020) Europe 2020 target
1 104.6 million tonnes of oil equivalent (Mtoe)	20% increase in energy efficiency (No more than 1 086 Mtoe of final energy consumption)

General objective: **A Stronger Global Actor**		
Impact indicator: GDP per capita (current prices-PPS) as % of EU level in countries that are candidates or potential candidates for EU accession **Source of the data**: Eurostat		
Baseline (2014)	**Interim Milestone** (2017)	**Target** (2020)
32.53% for Western Balkans (except Kosovo[1]: no 2014 data available for Kosovo.) 55.52% for Turkey	38% for Western Balkans 60% for Turkey	43% for Western Balkans 65% for Turkey

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

C.2 External factors

As stated above, the EU can have a positive influence on the research and innovation landscape, and address a series of challenges that can be better dealt with at EU level. But on its own this can never be enough.

On top of the EU investment in R&I, the investment by Member States and private industry is crucial. This is demonstrated by the headline target of 3% of investment of GDP in R&I by 2020. 2% of this should come from the private sector, and 1% from the public sector – and EU expenditure is only a small proportion of this 1%.

Member States generally sign up to the 3% objective. However, fulfilling all their national targets would only lead to an investment of 2.6% by 2020. And these targets are some way from being met. Even though investment in R&I can have a positive effect on growth, the difficulties in public finances across the Union have often led to reductions in research budgets.

This is an important external factor weighing on the achievement of objectives, but underlines that, although an effective implementation of spending programmes is important, it can never be enough. That is why there are important activities to persuade and help Member states to invest wisely in research and innovation.

As far as private sector investment is concerned, the level of investment is linked to a wide range of factors. These will be partly linked to the development of the global and European economy, but can also be linked to the conditions that encourage or hinder innovation. In particular, legislation and administrative barriers can be a hindrance to innovation, and even prevent it in some cases.

In many cases the possibilities of the DG, and of the Union as a whole, are limited, for example in areas of taxation, in others there may be ways to reduce the barriers to innovation, through action at EU level or by encouraging or facilitating developments in the Member States. These external factors explain why the DG puts emphasis on the establishment of framework conditions to encourage innovation.

The global economic and financial situation, especially following the banking crisis, has also caused difficulties for the flow of finance to riskier investments. This is another handicap to innovation, and explains the emphasis put on access to finance for innovators and SMEs.

Finally, other developments in the world have an impact on the DG, often requiring rapid and flexible responses and even changes of approach and priorities. The outbreak of Ebola in 2014 led to a call for proposals on treatments for Ebola completed in record time. In 2016 the outbreak of the Zika virus may have a similar effect. The urgency of dealing with climate change around the Mediterranean led to a demand for a new Public-Public Partnership on this subject (the PRIMA initiative). The situation in Syria, coming on top of other crises in Africa and the middle East, has meant that migration is now a major issue. The recent agreement with Iran related to nuclear technology requires a rapid and appropriate response from the DG. The recent COP21 agreement on climate change may require different research priorities, different targets or different legislative approaches.

These outside influences on a global scale show why international cooperation is so important, using Europe's strengths in science and technology to respond to global challenges, and using science diplomacy to deal with a changing world.

C.3 Specific Objectives: Overall introduction

EU support for research and innovation is provided only when it can be more effective than national funding, i.e. when it offers European added value. It has one single overriding objective: the achievement of impact. This is achieved through measures to coordinate national and private funding and by implementing specific measures to build a European Research Area (for example transnational collaborative research and mobility actions). These actions generate a series of benefits that could not be achieved by Member States acting alone.

For instance, the European Research Council (ERC), which promotes an EU-wide competition for funds and encourages higher scientific quality. As a result of EU leadership, a pan-European strategy on research infrastructures is now being implemented (through ESFRI, the European Strategy Forum on Research Infrastructures). The EU helps private companies come together and implement joint strategic research agendas through tailored instruments, such as European Technology Platforms and Joint Technology Initiatives.

The EU brings together compartmentalised national research funding using instruments such as the ERA Networks (ERA-NETs)[2], Joint Programming initiatives (Article 181) and Article 185 initiatives, which set common agendas and achieve the funding scale required for tackling important societal challenges. When it comes to implementing R&I projects through its own programmes, EU actions add value by stimulating transnational collaboration and mobility. This brings general efficiencies in avoiding duplication, and in some areas, such as support for collaboration, helps achieve the critical mass required for breakthroughs when research activities are of such a scale and complexity that no single Member State can provide the necessary resources (space, security, etc.). The cross-border, cross-sectoral, inter-disciplinary networks created in this way are durable, well-structured, and well-integrated into global innovation networks. For example, FP7 has created over 600,000 collaborative links between research-performing institutions in EU Member States.

The EU supports research which addresses pan-European (and even world-wide) policy challenges (e.g. environment, health, food safety, climate change, security) and facilitates the establishment of a common scientific base in these areas.

Working in transnational consortia helps firms to lower research risks, enabling certain research to take place. Involving key EU industry players and end-users reduces commercial risks, by aiding the development of standards and interoperable solutions, and by defragmenting existing markets.

Collaborative research projects involving end-users enable the rapid and wide dissemination of results leading to better exploitation and a larger impact than would be possible only at Member State level.

SME involvement in R&I at EU level improves their partnerships with other companies and laboratories across Europe and enables them to tap into Europe's creative and innovative skills potential, develop new products and services and enter new national, EU or international markets.

Companies can collaborate with foreign partners and end-users in projects tested for excellence and market impact on a scale not possible at national level. This induces them to invest more of their own funds than they would otherwise under national schemes.

Cross-border mobility and training actions are of critical importance for providing access to complementary knowledge, attracting young people into research, encouraging top researchers to come to Europe, ensuring excellent skills for future generations of scientists, and improving career prospects for researchers in both public and private sectors. The Marie Sklodowska-Curie programme

[2] Under Horizon 2020, the ERA-NET instrument enables Member States to come together to implement one substantial call from their own funds, with top-up funding from the Commission. In addition to this central element, the instrument is designed to support networking structures, in the design, implementation and coordination of joint activities as well as topping-up of actions of a transnational nature.

is a key tool assisting the mobility of researchers.

Cross-border innovation support leads to better policies and tools to help businesses bring innovation to the market.

The evidence from interim and ex-post evaluations on the results and impacts produced by EU Framework Programmes for Research and Innovation through value-added actions is substantial. For instance, the FPs: involve top researchers and organisations in high-quality research, train large numbers of scientists, improve participants' R&D capabilities, produce large numbers of high-quality, often collaborative scientific outputs, produce numerous technological outputs and innovations.

Through its support for research and innovation, the EU strives to achieve economic, social and environmental impact and to contribute to competitiveness, growth and job creation as well as the resolution of societal challenges. This is in full accordance with the new Commission's emphasis on performance in terms of results and impacts rather than inputs.

To make progress towards the four Commission General Objectives to which DG Research and Innovation contributes, it carries out activities which directly pursue a set of five specific objectives. These specific objectives are derived from Treaty of the EU and the mission letter of the Commissioner for Research, Science and Innovation, Mr Carlos Moedas, and reflect DG Research and Innovation's most significant activities and priorities.

General Objective 1: A New Boost for Jobs, Growth and Investment

Specific Objective 1.1: To strengthen Europe's R&I systems and achieve the European Research Area through working with Member States

While Europe is strong in research, it lags behind international competitors in innovating, and especially linking research and innovation. Part of the problem is the insufficient level of R&I investment and the insufficient impact of that investment in Europe, as well as the lack of coordination among Member States, resulting in fragmented and duplicated R&I efforts and a wide innovation divide in the European Union. Building a real European Research Area and transforming the results of research and other sources of knowledge into socio-economic impact is essential to creating jobs and growth and well-being in Europe.

Specific Objective 1.2: To establish the right framework conditions to capitalise on the results of European research and innovation by involving all actors in the innovation process ("Open Innovation")

As acknowledged by the Commissioner for Research, Science and Innovation, Mr Carlos Moedas, creating and supporting an Open Innovation ecosystem encourages dynamic knowledge circulation and facilitates the translation of that knowledge into socio-economic value. The clear strategy of DG RTD is to extend its work in this area to confront the identified problems. Five pillars for intervention are identified under this Specific Objective:

- Identifying regulatory obstacles to investment in innovation, in order to ensure that regulation is not an unjustified obstacle to innovation and that, wherever possible, it favours it;
- Encouraging effective innovation and investment in thematic areas and across different sectors for all types of innovative actors;
- Boosting investment and innovation, especially ensuring access to finance and advice for innovators;
- Circular economy, in order to implement innovative business models for sustainably boosting economic growth and renewing Europe's industrial capacities in a world of resources constraints;
- Supporting the Commission with high quality, timely and independent scientific advice for its policy-making activities

Specific Objective 1.3: To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies

Horizon 2020 is the EU Framework Programme for Research and Innovation. With a total budget of €76.4 billion (in current prices) for the period 2014-2020 (€74.8 billion for Horizon 2020 (2014-2020) and €1.6 billion for Euratom (2014-2018)), it provides a major opportunity for boosting innovation and growth in the EU. This has been demonstrated by the ex-post evaluation of the previous framework programme, FP7, which estimated that the programme directly created 130.000 jobs in RTD over a period of ten years while approximately 160.000 additional jobs are indirectly caused over a period of 25 years. FP7 also resulted in an additional annual GDP of approximately 20 billion euro for the next 25 years. Horizon 2020 will also help to mitigate specific problems identified in the European research landscape, such as mobility between Member States and collaboration between Member States, for example.

The strategy is to implement Horizon 2020 effectively to achieve its specific goals, and also to support the policy initiatives undertaken. In this respect, Horizon 2020 can allow for the building of a strong evidence base, the funding of pilot projects, and also to guiding research efforts to support policy.

Horizon 2020 is complemented by two other spending programmes, which will also contribute to the EU research and innovation policy in specific fields: the Research Fund for Coal and Steel (RFCS) and the Euratom Research and Training Programme (2014-2018).

A key activity during 2016-2020 will be to prepare the launch of the successors to Horizon 2020 and the Euratom Programme. Preparations for the ex-ante impact assessments will start at the end of 2016, with stakeholder consultations and legislative proposals following over the course of this strategic plan.

General Objective 2: A Connected Digital Single Market

Specific Objective 2.1: To increase impact and excellent science through openness ("Open Science")

A Digital Single Market is one in which the free movement of goods, persons, services, data and knowledge is ensured and where individuals and businesses can seamlessly access and use online content and carry out transactions under conditions of fair competition, with a high level of consumer and personal data protection, irrespective of their nationality or place of residence. Digital technologies and the exponential growth of data force a transition of research and science towards Open Science. Open Science aims to increase the impact and quality of science by making it more reliable, efficient and responsive.

Achieving a Digital Single Market will help Europe to take a global lead in open and data-driven science and thereby ensuring that Europe maintains its position as a world leader in the digital economy and society.

The role of Open Science is clearly identified in all three pillars of the Digital Single Market. Under pillar 3 (“Digital as Driver for Growth”) in particular, DG Research and Innovation is actively pushing the role of Open and data-driven Science as an enabler for scientific discovery, open innovation, trust and societal impact.

Specific Objective 2.2: Embedding digital into the grand societal challenges

EU science, research and innovation policy plays an important part in merging the physical and digital worlds by maximising the synergies between digital technologies and innovative solutions to societal challenges in areas like health, food, energy and water. Many synergies are already in place, but there are growing opportunities and challenges.

The overall aim is to combine R&I in thematic priorities of societal challenge areas (notably health, bioeconomy, energy, transport, eco-innovation) with new and emerging digital technologies and infrastructures (such as big data analytics, Internet of Things, intelligent robots and sensors, cloud and mobile computing, cyber security) to enable new solutions for public services and provide new market opportunities in all sectors (including the manufacturing sector and the science sector).

General Objective 3: A Resilient Energy Union with a Forward-Looking Climate-Change Policy

Specific Objective 3.1: To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy

The goal of a resilient Energy Union with an ambitious climate policy at its core is to give EU consumers – households and businesses – secure, sustainable, competitive and affordable energy. Achieving this goal will require a fundamental transformation of Europe’s energy system, integrated with sectors with important links to it, such as transport, industry, agriculture/bioeconomy and housing. It is necessary to move away from an economy driven by fossil fuels, and from an energy

system based on a centralised, supply-side model which relied on old technologies and outdated business practices.

Energy research and innovation is a key building block of the emerging Energy Union.

The Horizon 2020 and Euratom programmes support this Specific Objective by acting as transformation drivers of the energy system. The Horizon 2020 and Euratom programmes address important issues of European public interest (e.g. decarbonisation, creation of jobs and sustainable economic growth, industrial leadership, technological development) and provide a framework for European countries to engage in collaboration, as opposed to competition, which is a more beneficial approach in the long-term considering that most national research programmes have limited reach and that science is essentially a collaborative endeavour.

To support the policy, DG Research and Innovation is committed to allocate 35% of the Horizon 2020 budget to climate-related actions.

General Objective 4: A Stronger Global Actor

Specific Objective 4.1: To translate Europe's strengths in science and technology into a leading global voice ("Open to the World")

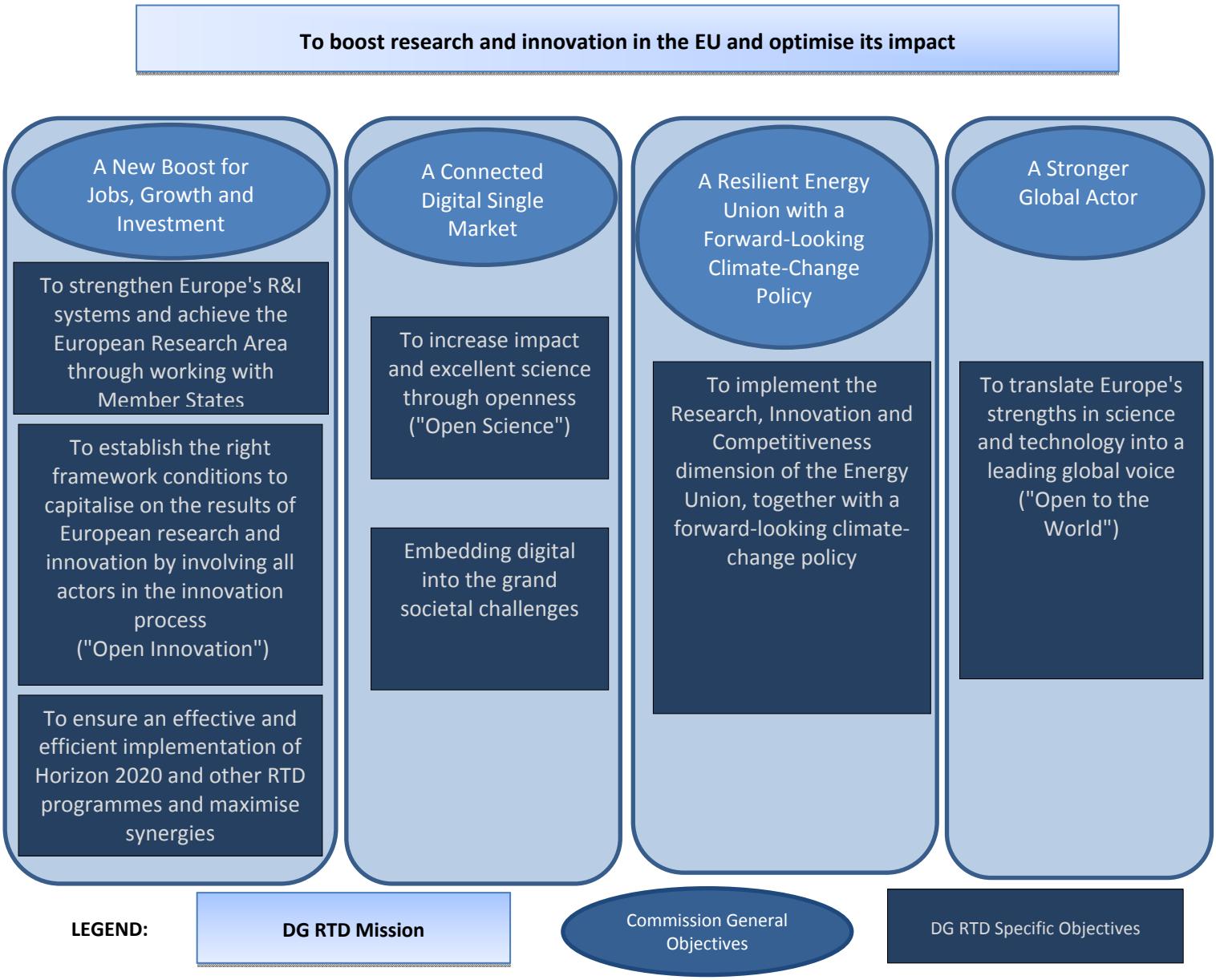
EU international cooperation in research and innovation contributes to the new Commission priorities as well as to the broader policies of the Union, as reflected in the Europe 2020 strategy. Specifically, as described in the Communication COM(2012) 497 'Enhancing and focusing EU international cooperation in research and innovation: A strategic approach', EU international cooperation in research and innovation aims to strengthen EU's excellence and attractiveness in research and innovation as well as its economic and industrial competitiveness, to tackle global societal challenges more effectively, and to support the EU's external policies.

The strategy is driven by the importance of cooperating internationally to give Europe access to the best talent, knowledge and resources wherever they are located; to tackle global societal challenges in the most effective way in a partnership approach; to help establish new opportunities for European high-tech industries through participation in global value chains and access to new and emerging markets; and to have a leading voice in global debates and developments.

International cooperation to tackle global societal challenges is often best implemented through global multilateral initiatives where solutions can be developed and deployed more effectively. DG Research and Innovation aims to strengthen the role and influence of the EU in such global partnerships.

Moreover, DG Research and Innovation aims to improve the framework conditions for engaging in international cooperation and use science diplomacy more broadly as an influential instrument of the EU's external policies. Furthermore, it holds regular Science and Technology cooperation dialogues with some 20 key international partner countries, as well as high level policy dialogues with the main world regions.

Priority areas and framework conditions for cooperation with the EU's main strategic international partners are reflected in European Roadmaps published every two years together with a report on the implementation of the strategy for EU international cooperation in research and innovation.


To boost research and innovation in the EU and optimise its impact
A New Boost for Jobs, Growth and Investment
To strengthen Europe's R&I systems and achieve the European Research Area through working with Member States
To establish the right framework conditions to capitalise on the results of European research and innovation by involving all actors in the innovation process ("Open Innovation")
To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies
A Connected Digital Single Market
To increase impact and excellent science through openness ("Open Science")
Embedding digital into the grand societal challenges
A Resilient Energy Union with a Forward-Looking Climate-Change Policy
To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy
A Stronger Global Actor
To translate Europe's strengths in science and technology into a leading global voice ("Open to the World")
LEGEND:
DG RTD Mission
Commission General Objectives
DG RTD Specific Objectives

C.3 4 Detailed presentation of each Specific Objective

General Objective 1: A new Boost for Jobs, Growth and Investment

Specific Objective 1.1: To strengthen Europe's R&I systems and achieve the European Research Area through working with Member States

As shown in section C.2, the European Union alone cannot strengthen Europe's R&I systems and achieve the European Research Area (ERA). A close collaboration with the Member States is required. More investment into Research & Innovation in Europe and at Member-State level, and the achievement of ERA, enabling transnational cross-fertilisation between R&I actors across the EU and Horizon 2020 associated countries are priority objectives. These objectives can potentially lead to stronger R&I systems with higher impact while research and innovation flows across national boundaries and priorities are aligned.

European Semester

The Commission introduced the European Semester mechanism as a yearly cycle aimed to facilitate the governance of economic policy. Two key milestones of the process are i) the publication by the Commission of a single analytical economic assessment per Member State, the Country Report, analysing its economic situation and its reform agendas, ii) the proposals by the Commission of country-specific recommendations for every Member State providing tailor-made policy advice in areas deemed as priorities for the next 12-18 months. In a context where the importance of research and innovation as economic policy tools is not yet fully perceived by all national policy-makers, it is essential to ensure an adequate integration of R&I aspects in those two types of documents.

To this end, DG Research and Innovation develops a comprehensive evidence-based approach targeting i) the identification for each Member State of its main R&I policy challenges, i.e. the key bottlenecks impeding the full contribution of R&I to smart, sustainable and inclusive growth, ii) the assessment of the adequacy of the policy response to the identified challenges. As detailed in thematic fiche on R&I available on the Europe 2020 website[3], three broad types of R&I policy challenges are considered: first, fostering the quality of the public R&I system; second, leveraging business R&I through public-private cooperation; third, ensuring a business environment supportive of private R&I investments and the emergence of fast-growing innovative SMEs.

However, it is up to the Member States to implement (or not) the Country Specific recommendations.

Policy Support Facility

The 2015 Annual Growth Survey[4] identifies research and innovation (R&I) as one of the seven priorities for Member State structural reforms to boost investment and growth. It highlights reforms to increase the impact of public funding through improved R&I strategies, programmes and institutions, as well as reforms to ensure an investment-friendly environment to stimulate business innovation.

The Horizon 2020 Policy Support Facility (PSF) was launched in March 2015 as a new instrument that gives Member States and countries associated to Horizon 2020 practical support to design, implement and evaluate reforms that enhance the quality of their R&I investments, policies and

[3] http://ec.europa.eu/europe2020/pdf/themes/2015/research_innovation_20151126.pdf

[4] COM(2014) 902 of 28 November 2014.

systems. Such reforms concern, for example, the stimulation of stronger and closer links between science and business or the introduction of performance-based funding of public research institutes.

To do so, the PSF provides Member States and countries associated to Horizon 2020 with access to independent high-level expertise and analyses through a broad range of services such as Peer Reviews of the national R&I systems, support to specific reforms or project-based mutual learning exercises. In addition, the PSF offers a Knowledge Centre via its website: https://rio.jrc.ec.europa.eu/en.

European Research Area

As set out in Article 179 of the TFEU, the Union has the objective of achieving a European Research Area (ERA) in which researchers, scientific knowledge and technology circulate freely. DG Research and Innovation supports the efforts of Member States and research organisations to implement the policies and reforms needed to achieve this objective. Following the conclusions of the European Council of 04 February 2011, the Commission intended to create by 2014 all the conditions necessary for the Member States and other stakeholders to complete the ERA. According to the Communication on the European Research Area – Progress Report 2014[5] the conditions for the completion of ERA are now in place. However, the completion of ERA, much like the internal market, is a gradual process and further implementation efforts are needed. Every year the Commission issues the ERA Monitoring Mechanism, which assesses progress in the implementation by Member States, research stakeholder organisations and the Commission of the set of ERA actions identified in the ERA Communication of July 2012[6]. Horizon 2020, next to national public research funding made available in Member States, is an important financial pillar for delivering ERA.

The existence of recognised world-level research infrastructures allows Europe to remain at the forefront of top-class scientific and technological development and innovation. DG Research and Innovation actively participates in the European Strategy Forum on Research Infrastructures (ESFRI), which supports the development of a European policy for research infrastructures. In particular, the ESFRI roadmap identifies new pan-European research infrastructures or major upgrades to existing ones. DG Research and Innovation supports Member States and Associated Countries in coordinating their efforts to identify new European research infrastructures to be included in the ESFRI Roadmap as well as to fully implement and ensure sustainability of operations of the infrastructures which entered the Roadmap in previous years.

The European Research Infrastructure Consortium (ERIC), established by Council Regulation (EC) No 723/2009, aims to facilitate the joint establishment and operation of large European research infrastructures among several Member States and associated countries. Since the adoption of the ERIC Regulation, twelve ERICs have been established. There are currently about 10 new ERIC applications in the pipeline just for the period 2016-2017 and DG Research and Innovation will continue assisting Member States towards the finalisation of their ERIC applications.

Specific Objective 1.2: To establish the right framework conditions to capitalise on the results of European research and innovation by involving all actors in the innovation process ("Open Innovation")

Open Innovation is about combining the power of ideas and knowledge from different actors (whether private, public or third sector) to co-create new products and find solutions to societal needs; It results in the creation of shared economic and social value. Fostering Open Innovation means creating the right ecosystems, increasing investment, and bringing more companies as well as

[5] COM(2014)575 of 15 September 2014.
[6] COM(2012)392 of 17 July 2012.

citizens and civil society organisations into the knowledge economy, while continuing to use research results in order to address grand societal challenges in Europe such as migration and unemployment. In the area of migration for instance, there is obviously a need in Europe to involve all actors from the academic and civil society sectors in sharing their knowledge and designing innovative policies in order to implement the European Agenda on Migration adopted in May 2015. Innovation will also benefit from raising young people's interest in science, increasing the participation of women in science at all levels, promoting ethical R&I by design and a more open science.

Five pillars for intervention are identified under this Specific Objective:

- Identifying regulatory obstacles to investment in innovation, in order to ensure that framework conditions are appropriate and regulation is not an obstacle to innovation and that, wherever possible, it favours it;
- Encouraging effective innovation and investment in thematic areas and across different sectors, for all types of innovative actors;
- Boosting investment and innovation, especially ensuring access to finance and advice, which is about facilitating access to funds and advisory mechanisms for innovative ideas, and especially with Small and Medium-Sized enterprises;
- Circular economy, in order to implement innovative business modes for sustainably boosting economic growth and renewing Europe's industrial capacities in a world of resources constraints;
- Supporting the Commission with high quality, timely and independent scientific advice for its policy-making activities.

These five pillars include a number of activities as demonstrated in the following:

Pillar	**Activities falling under each Pillar**
Identifying regulatory obstacles to investment in innovation	InnovREFIT
Encouraging effective innovation and investment in thematic areas	Contributing to industrial leadership through open innovation
Boosting investment and innovation	Maximise the use of the European Fund for Strategic Investments (EFSI)
	Synergies with the Structural Funds
	European Fund of Funds
	European Innovation Council
Circular economy	Circular economy implementation and monitoring
Supporting the Commission with high quality, timely and independent scientific advice for its policy-making activities	Scientific Advice Mechanism (SAM)

<u>Identifying regulatory obstacles to investment in innovation</u>

DG Research and Innovation has an activity in order to improve the regulatory environment for innovation to flourish, namely InnovRefit, aiming at the identification of regulatory obstacles to investment in innovation.

InnovREFIT

Innovation depends on a large number of systemic factors, including the incentives and obstacles set by the existing regulatory framework. A recent CEPS study[7] concludes that: 'EU regulation matters at all stages of the innovation process from R&D to commercialisation.' There is, however, no simple relation between innovation and the regulatory environment. For this reason, the Commission is committed to evaluate the impact of existing or proposed EU regulation on innovation to maximize the way it can support innovation. The Commission Better Regulation procedures and its rolling REFIT programme provide a framework for this work, allowing it to enhance innovation-based opportunities for sustainable growth, jobs and competitiveness. A favourable regulatory framework would also enhance the impact of Horizon 2020 and Member States financing instruments, especially supporting initiatives to tackle societal challenges and ensure industrial development, innovation and competitiveness in Europe. The "Think Small First" principle will be applied more thoroughly when preparing initiatives: taking the interests of small- and medium-sized businesses into account when designing and evaluating policies, and envisaging a lighter regime for them including an outright exemption for micro-businesses, wherever it is possible and makes sense.

In this context, the aim of this activity is to identify regulatory obstacles to investment in innovation. The areas to be considered include health, road vehicle automation, aircraft products certification, health technology assessment, food, eco-design for resource efficiency, energy-efficient buildings, electrified vehicles, low carbon hydrogen in transport, nanomaterials.

For the obstacles that have been identified the Commission relies on the Member States, and possibly the legislative authority of the EU, to implement the appropriate regulatory frameworks.

A further approach to be explored within InnovRefit is that of Innovation Deals. They will address regulatory uncertainties identified by innovators, which can hinder innovation within the existing legal framework. As a first step, a pilot action in the Circular Economy is foreseen to help innovators facing regulatory obstacles by setting up agreements with stakeholders and public authorities[8]. If this is successful, Innovation Deals could be extended to other areas. This will be in accordance with the principles of Better Regulation which encourage the involvement of stakeholders in making suggestions for more efficient EU regulation as for example through the REFIT platform.

<u>Encouraging effective innovation and investment in thematic areas</u>

Industrial leadership and competitiveness are important elements towards growth and jobs creation. The LEIT-NMBP part of Horizon 2020 as well as other activities beyond the implementation of Horizon 2020, are being developed to support industrial leadership and competitiveness through the deployment of four of the six Key Enabling Technologies (KETs) – nanotechnologies, advanced materials, industrial biotechnology, and advanced manufacturing and processing – enabling innovation in all key industrial sectors. Advanced manufacturing in particular is considered as a cross-cutting issue underpinning innovation. Joint Undertakings (public-private partnerships based on Article 187 TFEU) are designed to leverage further private investments. The funded projects are outcome oriented, and will bring solutions closer to applications and the market. Many of the applications address several societal challenges, notably health, energy and climate, as well as the circular economy. DG Research and Innovation is responsible for four Joint Undertakings.

[7] Does EU regulation hinder or stimulate innovation?, J. Pelkmans & A. Renda, CEPS Special Report No. 96, November 2014.

[8] http://ec.europa.eu/priorities/jobs-growth-investment/circular-economy/docs/communication-action-plan-for-circular-economy_en.pdf.

In addition, DG Research and Innovation is responsible for a number of contractual Public-Private Partnerships (cPPPs). These have been designed to increase leverage and to structure industrial needs around clearly defined roadmaps.

Boosting investment and innovation

The investment situation in R&I domain in the EU remains difficult, particularly for innovative SMEs and mid-caps with a high potential for growth. There are several major market gaps in the provision of finance, as the innovations required to achieve policy goals are proving too risky, typically, for the market to bear, and therefore the wider benefits to society are not fully captured. A comparison between the investment levels in the EU and in the United States demonstrates that one of the biggest differences in the ecosystem is venture capital. There is about five times less venture capital in Europe, and venture capital funds do not have the scale or scope to grow companies from early stage to mid-cap and from mid-cap to global players.

DG Research and Innovation is considering a number of activities which may improve access to finance, particularly for innovative SMEs, including a one stop shop for innovators under the "European Innovation Council". DG Research and Innovation intends to test the feasibility of these initiatives over the period 2016-2020 and put forward the most effective ones. Each initiative has a different time plan of implementation and will be elaborated in the forthcoming Annual Management Plans.

Maximise the effectiveness of the European Fund for Strategic Investments (EFSI) in Research and Innovation (EFSI)

'Research, development and innovation' is one of the priority sectors targeted by EFSI under the Innovation & Infrastructure window.

DG Research and Innovation has set a target of €50 billion of investments, via EFSI, for the benefit of the RDI sector, including the improvement of Research Infrastructures (RI).

DG Research and Innovation already oversees the implementation of the InnovFin suite of financial instruments by the European Investment Bank and the European Investment Fund. A variety of debt and equity facilities help companies and other types of organisation engaged in research and innovation to gain easier access to loans, guarantees, counter-guarantees and hybrid, mezzanine and equity finance. InnovFin can also be used to support research areas with specific needs, for example "InnovFin Infectious Diseases" which is a specific pilot financial instrument to facilitate the development of novel interventions for infectious diseases.

As part of EFSI's SME Window, an Equity Investment Platform (EIP) is under development with National Promotional Institutions (NPIs). The EIP will offer around €2bn in equity funding, with matching funds sought from NPIs for most of this amount. Investments are foreseen in Fund of , as well as direct investments in Venture Capital funds and via other channels.

The Investment Plan is already showing results. EIB estimates that by the end of 2015, the EFSI triggered around €50 billion of investment in Europe. Out of the 42 projects approved by the EIB so far, 5 projects are in the RDI sector. This figure does not include many other energy, transport, ICT and health projects of which RDI is a significant part. Discussions are currently ongoing to find a way to capture this effect.

Synergies with the Structural Funds

Particular care was taken during the legislative process for Horizon 2020 and the European Structural and Investment Funds (ESIF) to ensure that there were no legal barriers to the creation of synergies between the Funds. This was assured. However, there is still considerable work to do to ensure that, at national level, these synergies are effectively implemented and profited from. As a result, the respective regulations provide that several EU funding sources can support the same action (but not the same cost item). Cohesion projects supporting R&I can now use the same cost reimbursement rules as Horizon 2020 and regions will be able to spend part of their funding in other regions and Member States, if it is for their benefit. This can, for example, encourage greater support from cohesion funding for ESFRI (European Strategy Forum on Research Infrastructures) research infrastructures or for the full scale implementation of solutions piloted under Horizon 2020 demonstration projects, for example for nature-based solutions in specific cities or regions.

DG RTD was closely involved in the major tasks relating to the negotiation and adoption of the ESIF programming documents (Partnership Agreements and Operational Programmes) and the assessment of the related Smart Specialisation Strategies (RIS3) that underpin future support for R&I through the Structural Funds, and will now take part in the monitoring of their implementation.

A concrete action in the framework of Synergies with the Structural Funds is the use of ESIF funds to build research capacities and infrastructures at national and regional level, in line with the relevant smart specialisation strategy, ensuring their inclusion in the operational programmes and reference where relevant to the ESFRI Roadmap.

DG Research and Innovation systematically contributes to DG REGIO's assessment of the fulfilment of the ex-ante conditionality on the Research and Innovation Infrastructure priority of the ERDF, analysing and supporting Member States in defining their indicative multi-annual plan for budgeting and prioritisation of investments linked to Union priorities, and, where appropriate, the European Strategy Forum on Research Infrastructures (ESFRI).

Also in the context of the ESFRI Roadmap exercise, Member States and Associated Countries have been encouraged to seek links between their national RI roadmaps to the ESFRI roadmap and to take this into account in the design of their Smart Specialisation Strategies.

The Commission has also introduced a number of specific actions under LEIT-NMBP part of Horizon 2020 which contributes to stimulating synergies with ESIF. As an example, the proposers are encouraged to actively seek synergies with, and possibilities for further funding, from other relevant EU, national or regional research and innovation programmes (including ESIF), private funds or financial instruments, possibly in connection with Smart Specialisation Strategies.

DG Research and Innovation is working in close cooperation with DG REGIO, DG CNECT, the JRC and the EIB in order to maximise synergies between H2020, the European Structural and Investment Funds (ESIF) and the European Fund for Strategic Investments (EFSI). Moreover, a Knowledge Exchange Platform between the Commission and Committee of the Regions has been established to valorise and increase the impact of Europe's R&I programmes and initiatives on innovation at local and regional level.

One concrete action in support of synergies is the “Seal of Excellence”. This is a quality label, awarded to project proposals submitted for funding under Horizon 2020, which succeeded in passing all of the stringent selection and award criteria but could not be funded under the available Call budget. The “Seal of Excellence” certificate is awarded to the applicants of excellent proposals that cannot be funded: a holder of the certificate can then approach alternative funding sources (public or private), i.e. national, regional, European or international, and present the certificate as a label of a high-quality project proposal.

The “Seal of Excellence” is a pilot initiative and its implementation is expected to provide DG RTD with valuable learning on its design and implementation modalities. It is up to each Member State or region to decide to establish supporting funding schemes that are specifically dedicated to these types of proposals and enable the provision of alternative funding, in compliance with national and EU rules. A growing number of Member States and regions are already studying the best options for implementation. In order to facilitate exchanges of know-how, DG RTD has established a 'Community of Practice' exploring the best possible ways for implement funding schemes in support of high-quality projects with the 'Seal of Excellence' through ESIF or other sources.

In the initial “pilot” phase the action concerns only proposals applying for the SME instrument. The “SME instrument” has been selected for the introduction of the “Seal of Excellence” because of its relevance to regional and national funders, as the project proposals are mostly led by a single SME and address small scale R&I actions close to the market with a clear territorial impact. Later on it could be extended to cover more areas of Horizon 2020.

European Fund of Funds (FoF)

A Fund of Funds is an investment vehicle that invests in other funds. Because a FoF invests across a wide range of Venture Capital (VC) funds, as well as geographically, it lowers the risk to investors, as their risk exposure is diversified. The funds in which the FoF invests then themselves invest in individual small firms. A pan-European Venture Capital (VC) FoF would use a cornerstone investment from the EU as a signal to potential investors of the seriousness of the EU's intent to enable greater VC investment in Europe.

DG Research and Innovation commissioned a major study in 2015 into the potential for EU investment into FoFs at EU level. The study makes a strong case for supporting one or more VC FoFs at EU level to help address Europe's equity gap, the fragmentation of the market, and the poor performance of European VC funds in raising finance from major institutional and other private investors. The study advocates that a pan-European VC FoF should be accompanied by a package of measures such as a capacity-building scheme for VC fund managers in less mature markets, and an awareness-raising initiative promoting VC as an asset-class to prospective investors.

European Innovation Council

The current innovation support landscape is complex and challenging for many innovators to access. As a consequence, public interventions at EU level appear to suffer from a lack of overall socio-economic impact, notably in terms of disruptive market-creating innovation. The setting up of a European Innovation Council (EIC) has been put forward as a possible solution by the Commissioner for Research, Science and Innovation, Mr Carlos Moedas, in the context of the mid-term review of Horizon 2020. An EIC could involve new business processes, forms of support, governance model and/or an advisory function. It is intended that an EIC would attract Europe's most promising innovators and help them scale up their ideas into world-beating products and services which will contribute to future jobs and growth. In addition an EIC could potentially address other key elements of the innovation ecosystem, for example in the public sector, which could help foster solutions to grand societal challenges.

Circular Economy

The Circular Economy Package, which includes a Communication for an Action Plan and legislative proposals on waste recycling targets, was adopted on 2 December 2015.

Circular Economy is a clear example of Open Science and Open Innovation: for circular economy business models to be effective, there is a need for open data (for primary and secondary raw materials and for products on land and the sea), for collaboration among different stakeholders along the value chain, for use and combination of different knowledge bases, and for end-users as drivers of innovation.

DG Research and Innovation has been supporting innovation as an essential element of the Circular Economy Package.

Other actions in that area include ensuring effective Horizon 2020 investment, including the use of Financial Instruments, coordination with Member States, awareness raising and review of the Commission's 2012 Bioeconomy Strategy.

Supporting the Commission with high quality, timely and independent scientific advice for its policy-making activities

The Scientific Advice Mechanism (SAM) was set up on 13 May 2015 with the aim to support the Commission with high quality, timely and independent scientific advice for its policy-making activities. This will contribute to the quality of EU legislation, in line with the Better Regulation agenda. The Scientific Advice Mechanism will draw on the wide range of scientific expertise in Europe through a close relationship with national academies and other bodies, as well as the expertise of a High-Level Group of independent scientific advisors.

The core of SAM is the High Level Group of Scientific Advisors, set up by the Commission Decision of 16 October 2015[9]. The group is composed of seven highly qualified, specialised, independent experts, appointed in their personal capacity and who act independently and in the public interest.

DG Research and Innovation hosts the SAM secretariat which aims at supporting the overall work of the SAM High Level Group and facilitating their interaction with the EU policy making process. The SAM secretariat will also facilitate the High Level Group's access to key sources of scientific evidence: the EU research funded under Horizon 2020 - including the activities of the EC Joint Research Centre, EU Agencies, the European Academies and the scientific community at large.

Specific Objective 1.3: To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies

This specific objective focuses on the implementation of Horizon 2020, and the Research Fund for Coal and Steel (RFCS) in an effective and efficient manner.

Horizon 2020 is the EU Framework Programme for Research and Innovation. With a budget of €74.8 billion (in current prices) for the period 2014-2020, it represents a major opportunity for boosting innovation and growth in the EU. It focuses on three major areas: excellent science, industrial leadership and societal challenges. Two additional objectives pursued are to spread excellence and widen participation and to promote efficient cooperation between science and society. Another focus is the Horizon 2020 cross-cutting issues.

[9] Commission Decision "on the setting up of the High Level Group of Scientific Advisors", C(2015)6946 of 16 October 2015.

Moreover, Horizon 2020 provides funding through instruments, such as the ERA Networks (ERA-NETs)[2], Joint Programming initiatives (Article 181) and Article 185 initiatives. The "European Human Biomonitoring Initiative" and the "One Health" (zoonosis – emerging threats) are planned to benefit from the European Joint Programme (EJP) co-fund mechanism.

The objective is to implement Horizon 2020 effectively to achieve the goals set by the legislative authority. The legal basis of Horizon 2020 identifies 14 cross-cutting issues and establishes targets for some of them.

The Euratom Research and Training Programme complements Horizon 2020 in the field of nuclear research and training with a budget of €1.6 billion (in current prices) for the period 2014-2018[10]. Euratom is presented under Specific Objective 3.1, "To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy".

A set of performance indicators selected from the legal basis of Horizon 2020 has been introduced in the Strategic Plan. Given the time lag between the implementation of Horizon 2020 and the results for a number of indicators it is expected to deliver, the latter cannot be measured in the first years following the launch of the programme. The Strategic Plan also includes indicators linked to the cross-cutting issues that are related to the activities of the Directorate-General Research and Innovation, including all the mandatory targets set in the legal text.

The RFCS supports research and innovation projects in the coal and steel sectors. These projects cover: production processes; application, utilisation and conversion of resources; safety at work; environmental protection and reducing CO_2 emissions from coal use and steel production.

General Objective 2: A Connected Digital Single Market

Specific Objective 2.1: To increase impact and excellent science through openness ("Open Science")

DG Research and Innovation contributes to all three pillars of the Digital Single Market (DSM) strategy. In particular under pillar three, "Digital as Driver for Growth", it is actively pushing the role of Open Science as driver of Open Innovation, to increase research data sharing to boost scientific discovery, innovation, trust and social benefit and to maximise synergies between DSM priorities and R&I thematic priorities, such as health, food and energy.

Activities that fall under this Specific Objective are the following:

<u>European Open Science Cloud</u>

The European Open Science Cloud aims to position the EU in a leading role globally in scientific infrastructures and ensure that European stakeholders reap the full benefits of data-driven science and services for the digital economy and wider society. The **European Open Science Cloud** will offer 1.7 million European researchers and 70 million professionals in science and technology a virtual environment with free at the point of use, open and seamless services for storage, management, analysis and re-use of the data that are linked to their research activities, across borders and scientific disciplines. It will support the development of "big data" in research and innovation.

The initiative will increase awareness of the value of data and the potential of Open Science and help change the structure of incentives for academics, industry and public services to share their data as far as possible. It will enable interoperability for data sharing, long-term accessibility and re-use through integrated and sustainable infrastructures accessible across disciplines in both public and

[10] In line with Article 4 of the Council Regulation (Euratom) 1314/2013. Extension of the Programme for 2019-2020 requires a new Council Regulation.

private areas. It will provide High-Performance Computing capacity required for Europe to realise its potential and compete globally. And it will address the challenges of fragmentation by the federating of scientific infrastructures, to increase efficiency and rationalise costs with pan-European governance.

Overall, the European Open Science Cloud will address the capacity of digital infrastructure, consolidate open scientific services, and governance. There are a range of policy issues to address (rewards for researchers, assess and protection (IPR), clarification of the funding model for data generation and preservation, reducing rent seeking and priming the market for innovative services (for example text data mining). Horizon 2020 can contribute to the objective, through contribution to the European Open Science Cloud for Research as well as Data and Distributed Computing e-infrastructures for Open Science. Pilot actions may be launched demonstrating how wide availability of scientific data and data-analysis services for European researchers can be ensured through a cloud infrastructure.

Open Access/Open Data (including Horizon 2020-related activities)

Publicly funded knowledge must be available for researchers, citizens and the private sector, to enhance the knowledge base, diminish regional discrepancies and promote innovative solutions to societal challenges. Unrestricted access to publications is backed by a growing number of universities, research centres and funding agencies across Europe.

DG Research and Innovation works with Member States for the joint development of the best strategies to improve access to scientific knowledge in order to boost the impact of scientific research and Europe's innovation capacity. The Commission adopted a Recommendation to Member States "on access to and preservation of scientific information" was issued in July 2012, as the result of a joint activity with DG CNECT.

Horizon 2020 has mandated open access to scientific publications as a general principle for all research activities. The access can be immediate upon publication or delayed for a certain period. Horizon 2020 also promotes open access to research data using a flexible approach in the form of a pilot action, taking into account differences among scientific areas and among participants.

However, the activities need to go beyond Horizon 2020, to develop wider open access, for all funders and all researchers.

The implementation of the General Data Protection Regulation will be important in this context, to guarantee that privacy rights will be adequately protected in the future in view of rapid technological developments while ensuring the free flow of personal data within the EU. The rules for the processing of personal data for scientific research purposes are currently fragmented, guidelines and codes of conduct are needed to arrive at a single set of rules valid across the EU.

Copyright exception for Text and Data Mining (TDM) in the EU copyright legislation

A harmonised copyright exception for scientific research purposes was identified as a key for the functioning of the Digital Single Market. In the Communication "Towards a modern, more European copyright framework", adopted in December 2015, the Commission considered in particular to allow public interest research organisations to carry out TDM of content they have lawful access to, with full legal certainty, for scientific research purposes.

This activity aims at ensuring that the upcoming EU copyright revision includes a mandatory, practical copyright exception for TDM in research. This will help scientists to create new knowledge with the vast amounts of data available, giving them a competitive advantage.

Research Integrity

This activity is about the implementation of a European initiative on research integrity, including clear standards and mechanisms to tackle scientific misconduct, a prerequisite for achieving excellence in research and innovation in Europe and beyond. Research and innovation based on academic freedom and integrity is an essential element for a trustworthy knowledge-base. The Council (Competitiveness Council of 30 November and 1 December 2015) recognised the importance of open science as a mechanism for reinforcing research integrity, while, at the same time, recognising that research integrity contributes to open science. On the other hand the Council acknowledges that integrity in both public and private research can be damaged by research misconduct.

The primary responsibility for research integrity is with researchers themselves. Therefore, research organisations and Member States should find appropriate channels for the examination of alleged misconduct by researchers. The actions under this activity will be based on the principles listed in the "European Code of Conduct for Research Integrity"[11] (i.e. honesty, reliability, objectivity, impartiality and independence, open communication, duty of care, fairness, responsibility for future generations) developed by the European Science Foundation (ESF) and All European Academies (ALLEA). In support of this the Commission will aim to reinforce the Horizon 2020 Grant Agreement (Article 34 on Ethics and Research Integrity) and launching an action to update and strengthen the ALLEA/ESF Code in order to address the emerging challenges and develop an inclusive and truly European code.

Within this activity Member States and the Commission will further promote existing research integrity networks, such as the European Network of Research Integrity Offices (ENRIO). Moreover, Member States are encouraged, in collaboration with the Commission, to step up efforts on their mutual learning exercises, including within the framework of the European Research Area and Innovation Committee (ERAC) as well as of the Horizon 2020 Policy Support Facility.

Horizon 2020 funding can help in forwarding this initiative but there are many questions of a policy nature that need to be addressed that are independent from the Framework Programme.

Specific Objective 2.2: Embedding digital into the grand societal challenges

Commissioner Moedas' mission letter includes a focus on maximising the synergies between projects funded Horizon 2020 and the realisation of the priorities as regards the Digital Single Market and the European Energy Union, by making effective use of funds available for instance for energy efficiency, low-carbon technologies and digital technologies. In line with this mandate the political objective is to combine R&I in thematic priorities of societal challenge areas (notably health, bioeconomy, energy, transport, eco-innovation) with new and emerging digital technologies and infrastructures (such as big data analytics, Internet of Things, intelligent robots and sensors, cloud and mobile computing, cyber security) to enable new solutions for public services and provide new market opportunities in all sectors (including the manufacturing sector and the science sector). The overall aim is to increase the impact of Europe's investment in R&I and its innovation capacity, its tackling of societal challenges, and its competitive advantage and job creation.

This requires a boost to private investment to modernise and digitise industry, which can come from regulatory reforms and removal of barriers, as well as from Horizon 2020. Within Horizon 2020 this process will be assisted through contractual Public Private Partnerships (e.g. Factories of the Future, SPIRE), including support for demonstration projects under Horizon 2020 to showcase 'Industry 4.0'. This would leverage the work of the cPPPs and facilitate links with InnovREFIT and investment plans.

[11] Available at http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf.

"Physical-digital" demonstrations, piloting activities and infrastructures for experimentation and co-creation with users

This activity is about funding demonstrations, pilot activities and infrastructures for validating the societal, economic and technical viability and gather evidence of impacts/benefits of ICT-enabled innovative solutions in real world settings. In particular, activities include validation of how user/citizen/society needs and acceptance are met, how digital-physical integration is best achieved, how new value chains and business models could develop, and how systemic change could occur – creating entirely new markets- e.g. in a circular economy, sharing economy, service-product offerings, smart factories, etc.

Activities will build as much as possible on already existing infrastructures, and the results and the data collected in pilots/demos should be exploited to share best practice and to encourage replication and scale-up of innovative solutions, possibly drawing also on structural funds. Access to these "innovation infrastructures" should be facilitated for all, notably for SMEs and other smaller actors, to ensure "Open innovation" and articulate with larger firms and innovation clusters.

Partnerships between thematic application sectors and the digital sectors

This activity aims at bringing together research and innovation players from the digital and the physical spheres from the early phases in the innovation cycle, to address challenges and opportunities together, share information, foster interdisciplinary initiatives and enhance collaboration in providing innovative systemic solutions in thematic and cross-thematic application sectors/domains. In particular, this means establishing and promoting "digital strands" of thematic partnerships/groups and, vice-versa, advocating "thematic/application strands" cutting across digital partnerships/groups.

Removing barriers of "digitally-enabled" innovation and the creation of new markets

This activity addresses issues such as skills, regulatory frameworks, openness and free flow of data, systems interoperability, privacy, security and IPR issues. In particular, this means stimulating investments in training, up-skilling and cross-skilling, as well as in strategic approaches to avoid fragmented and unharmonised frameworks, reviewing and advocating revisions in regulatory frameworks, and ensuring regulatory certainty/predictability as far as possible.

The efforts may lead to developments in areas, such as: in customised innovation and production, greener and more sustainable societies (for example by smart water management systems), new models of health care (shifting the focus from treatment and cure to prediction and prevention, big data analytics for early diagnosis and optimised therapeutic interventions for example), smart manufacturing and logistics in food processing and retail to reduce waste and improve resource efficiency and food safety, smart energy metering, driverless cars, hybrid-electric propulsion of aircraft, intelligent transport systems, smart buildings and reducing waste generation.

European industry needs to be among the drivers of the Fourth Industrial Revolution to transform entire systems of production, distribution and consumption, disrupt current business models and generate new international market opportunities. Many challenges of making our industrial system truly flexible, intelligent, resilient, resource efficient, human centred and highly competitive rely a great deal on the use of digital technologies.

General Objective 3: A Resilient Energy Union with a Forward-Looking Climate-Change Policy

Specific Objective 3.1: To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy

Strategic Energy Technology (SET) Plan

The contribution made by research and innovation to the objectives of the Energy Union and to achieving the EU's ambitious climate and energy targets is coordinated through the Strategic Energy Technology (SET) Plan. The SET Plan is a policy initiative managed jointly by DGs Research and Innovation, ENER and JRC with DG ENER as Chef de File.

The SET Plan has been the technology pillar of the EU's energy and climate policy since it was established in 2007. It aims to better align public and private, European and national R&I agendas in the field of low-carbon energy. It is not a funding instrument but a strategic planning and programming instrument that follows and contributes to the policy agenda. Nevertheless, funding remains crucial to its success. Its priorities are implemented by European programmes (~ 6% of total investment, mainly the Research Framework Programmes and the New Entrance Reserve (NER 300) Programmes). However, most of the funds are non-EU funds - from national (~ 28% of total investment) and in particular industrial sources (~ 66% of the investment).

Since its inception, the SET Plan has directly supported the development of key low-carbon energy technologies by the EU, participating countries and industrial and research actors. It has contributed to reducing the cost of these technologies and to facilitating large-scale deployment by structuring national and EU programmes around shared objectives, which has triggered substantial investment. The annual total research and development investment in the SET Plan priority technologies more than doubled in the EU from 2007 to 2011, from EUR 2.8 billion to EUR 7.1 billion.

Over the period 2016-2020 the Commission will implement the ten key actions of the SET Plan that target the research and innovation priorities of the Energy Union. These actions are described in the Communication "Towards an Integrated Strategic Energy Technology (SET) Plan"[12] adopted in September 2015. DG Research and Innovation is contributing to all the 10 key actions but is Chef de file on four of them, namely:

1. Sustain technological leadership by developing highly performant renewable technologies and their integration in the EU's energy system;
2. Reduce the cost of key technologies;
9. Step up R&I activities on the application of carbon capture and storage (CCS) and the commercial viability of carbon capture and use (CCU);
10. Maintain a high level of safety of nuclear reactors and associated fuel cycles during operation and decommissioning, while improving their efficiency.

Energy Union Integrated Strategy in Research, Innovation and Competitiveness

DG Research and Innovation will be responsible for presenting an integrated Energy Union strategy for research, innovation and competitiveness expected in 2016 and for implementing the set of actions therein. It will go beyond strictly energy concerns, to encompass other relevant sectors for energy and climate, such as transport, industrial production, agriculture/bioeconomy and housing - in an integrated manner to ensure that the overall goals are not lost in the trade-off between the individual sectors. All of these sectors are crucial to combatting climate change and ensuring energy security.

[12] Communication from the Commission "Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation", C(2015)6317 of 15 September 2015.

In order to achieve the objectives set in the Paris Agreement at COP21, the EU post-2030 decarbonisation objectives have to be scaled-up in ambition. For preparing this, an ambitious research and innovation initiative has been launched for developing credible and feasible post-2030 decarbonisation pathways in close consultation with stakeholders and steered by a High-level Panel.

Horizon 2020 and Euratom Programmes

Horizon 2020 and Euratom programmes are crucial instruments helping Europe achieve its Energy Union ambitions.

In Horizon 2020 this is particularly the case for the Energy and Transport, Climate and Bioeconomy societal challenges, as well as for the area of Key Enabling Technologies "Advanced Manufacturing and Processing". The Euratom Programme dedicates 100% of the budget to Energy Union priorities by maintaining European technological leadership in the nuclear domain, both in fission and fusion, and improving nuclear safety and waste management.

DG Research and Innovation particularly focuses on developing the next generation of renewable energy technologies and their integration in the energy system (including energy storage) to secure a world-leading position in this field and on designing energy-efficient and clean means of transport.

Three public-private partnerships based on Article 187 TFEU (Joint Undertakings) are also significantly contributing to the Energy Union objectives: the Fuel Cells and Hydrogen 2, the Clean Sky 2 and the Bio-Based Industries Joint Undertakings.

There is also a clear aim in the actions of DG Research and Innovation to support first-of-a-kind, commercial-scale industrial demonstration projects in low-carbon energy technologies.

The COP 21[13] decision on the "Paris Agreement" established new priorities that will require scientific support and technological development, in particular to develop technological and non-technological means to keep global warming "well below 2°C with respect to pre-industrial levels" (and seeking for reaching 1.5°C), how to develop climate services and how to help in particular developing countries to mitigate and to adapt to climate change.

DG Research and Innovation oversees the implementation of the ambitious budgetary targets of Horizon 2020 regarding climate action (35% of expenditure) and sustainable development (60%). International fora are crucial to effectively addressing energy and climate issues and DG Research and Innovation is committed to contributing fully to them.

[13] UNFCCC Conference of Parties - The Conference that takes place annually since 1995 with the main objective to review the implementation of the United Nations Framework Convention on Climate Change. COP21 took place in Paris (30 November-12 January 2015) and its conclusions are summarised in the "Paris Agreement".

General Objective 4: A Stronger Global Actor

Specific Objective 4.1: To translate Europe's strengths in science and technology into a leading global voice ("Open to the World")

The strategy for EU international cooperation in research and innovation underlines that global challenges call for global responses and that engaging in international cooperation is essential to access the highest quality knowledge and the best talent worldwide, to tackle global societal challenges in the most effective way, and to create business opportunities in particular in new and emerging markets, thus increasing EU's competitiveness.

The Ebola, and now the Zika outbreak, and now the migration crisis, show how global events impact on Europe, and require rapid and flexible approached to its research and innovation efforts.

Actions of the strategy include: opening Horizon 2020 fully to third country participants (general opening); targeted international cooperation activities with the scale and scope necessary to maximise impact; development of multi-annual roadmaps for cooperation with key partner countries and regions; reinforcing the partnership between the Commission, the Member States and relevant stakeholders; promoting common principles for the conduct of international cooperation in R&I; enhancing the role of the Union in international organisations and multilateral fora; and strengthening implementation, governance, monitoring and evaluation.

A dual approach focusing on general opening and targeted international cooperation has been adopted for Horizon 2020 and, based on policy dialogues with key international partner countries and regions, roadmaps of jointly agreed priorities for cooperation are updated on a regular basis involving also their inclusion in Horizon 2020 work programmes. In this strategic planning process, attention is paid to achieving closer coordination between the activities of the Member States and Associated Countries and those of the EU, in particular through the Strategic Forum for International S&T Cooperation, SFIC.

DG Research and Innovation is proactive in improving the framework conditions and common principles that underpin international cooperation. It is also leading several multilateral initiatives and working with international organisations; it is maximising synergies with the EU's external policies; and, finally, it is monitoring and reporting on the overall implementation of the strategy every two years.

Science and technology cooperation is very often an important element in deepening relations with key partners of the EU. DG Research and Innovation holds regular Science and Technology cooperation dialogues with some 20 key international partner countries, as well as high level policy dialogues with the main world regions. These dialogues cover thematic research and innovation cooperation as well as efforts to ensure favourable and equitable conditions for the efficient cooperation of researchers and innovators.

Activities that fall under this Specific Objective are the following:

"Global Research Area"

The aim is to improve the framework conditions and common principles for researchers and innovators to work together smoothly with colleagues worldwide and for researchers, scientific knowledge and technology to circulate as freely as possible. The building of a 'Global Research Area' will proceed step-by-step with different priorities and actions that vary from one region to another, based on the EU's specific objectives for each region or group of countries in question.

The focus of the EU's cooperation with its neighbours on research and innovation is to foster integration into, or alignment with, the European Research Area, including through their possible association to Horizon 2020. This is contributing to achieving a 'Common Knowledge and Innovation Space' between EU and its neighbours including improving the research and innovation competences

of these countries and addressing in a sustainable manner the most urgent common challenges the EU and its neighbours face.

Science diplomacy

The aim is to establish science diplomacy as an instrument of external policy. International R&I cooperation, scientific exchange and mobility, and scientific values of rationality, transparency, integrity and universality can help prevent or solve conflicts and crises, underpin good governance and policy making, and build trust between nations and people, regardless of national, cultural or religious backgrounds. The network of science Counsellors that DG RTD manages (about 30 people) in EU Delegations all over the world is also a precious resource for effecting these objectives.

Research and Innovation to help manage migration

Research and innovation actions have a valuable contribution to make in addressing the root causes of migration and to underpin policy responses by knowledge and data. Creating a 'Common Knowledge and Innovation Space' between EU and its neighbours will contribute to create economic stability in the region.

- DG RTD will continue to be actively involved in the implementation of the mobility and migration part of the revised European Neighbourhood Policy.
- DG RTD will also support initiatives such as the Partnership for Research and Innovation in the Mediterranean Area (PRIMA), expected to mobilise joint actions on food and water systems.
- DG RTD will continue to engage in EU-Africa cooperation in science, technology and innovation, including e.g. on Food and Nutrition Security and Sustainable Agriculture, leading to knowledge-based sustainable job creation and tackling common global challenges.

In particular, DG RTD will:

- Seek to Strengthening bilateral and multilateral science, technology and innovation (STI) policy dialogues on migration, e.g. EU-Africa STI High Level Policy Dialogue and the EU-Med Group of Senior Officials on research and innovation.
- Promote mutually-beneficial migration and mobility through "brain circulation" schemes, including on the model of the European and Developing Countries Clinical Trials Partnership (EDCTP) and introducing actions targeting the countries and regions concerned.
- Better focus Horizon 2020 calls for proposals related to migration in social sciences and the humanities and other relevant research and innovation domains.
- Continue the Science4Refugees initiative.
- Support a scheme to attract non-EU resident highly-skilled entrepreneurial innovators.

The research needs identified during the International Conference 'Understanding and Tackling the Migration Challenge: The Role of Research' in February 2016 will serve as a basis to prepare additional Horizon 2020 calls for proposals related to migration in social sciences and the humanities and other relevant research and innovation domains.

Specific international cooperation initiatives

Europe needs to assert its global influence to the evolution of science and technology underpinning major global societal challenges, e.g. in food and water security or climate-change. It also needs to take advantage of rising excellence, new value chains and growing markets beyond Europe, e.g. in China or South-East Asia. Targeted international cooperation activities will therefore continue to be developed on the basis of mutual benefit, optimal scale and scope, partnership and synergy to appropriate emerging research and innovation capacities across the world.

The Science and Technology agreements and the corresponding international dialogues DG Research and Innovation entertains with key partner countries and regions are the basis of our engagement and the roadmaps of cooperation priorities. All available instruments are put into use to implement this thematic cooperation and to maximise the impact of international cooperation on research and innovation (e.g. with sub-saharan Africa in the context of EDCTP-2). Horizon 2020 is the main vehicle, with full opening to participants from across the world and with many topics specifically targeting international cooperation. Communication and awareness raising activities will continue to attract the world's best scientists, researchers and innovators.

Stronger synergies with Member States activities will be sought in implementing thematic cooperation but also in ensuring a strong voice for Europe in international fora and organisations and multilateral fora, such as GEO, IPCC, the Belmont Forum, the Arctic Council, WHO or UNESCO. This will be done through improved positioning and leverage effects of multilateral initiatives and through a stronger and more coherent EU strategy vis-à-vis activities of international organisations (as, for example, the rapid international coordinated research response in case of health emergencies, such as the Ebola or Zika outbreaks, via the GLOPID-R international consortium), including through synergies and coordination with Member States via SFIC.

Such initiatives may arise at any time over the strategic planning process, depending on developments in the world. Examples are: the possible participation of the Union in a research and innovation partnership on food systems and water resources in the Mediterranean basin, next steps towards an 'All Atlantic Ocean Research Alliance', and expansions of recently-created international partnerships tackling major global societal challenges such as, for example, the International Rare Diseases Research Consortium.

D. Key performance indicators (KPIs)

In order to assess its performance the following key performance indicators (KPIs) have been selected by DG Research and Innovation:

1. Share of funds allocated to SMEs in the Horizon 2020 societal challenges and in the enabling and industrial technologies (DG RTD) (see Annex 1, Specific Objective 1.3, "To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies");
2. Share of newcomers among the successful applicants (Horizon 2020 – DG RTD) (see Annex 1, Specific Objective 1.3, "To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies");
3. Climate-related and sustainability-related expenditure (Horizon 2020-DG RTD) (see Annex 1, Specific Objective 3.1, "To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy");
4. Share of third-country participants in Horizon 2020-DG RTD (see Annex 1, Specific Objective 4.1, "To translate Europe's strengths in science and technology into a leading global voice ("Open to the World");
5. Share of grants signed with a time-to-grant within 245 days (see Annex 1, Specific Objective 1.3, "To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies")

PART 2. Organisational management

A. Human Resource Management

Objective (mandatory): The DG deploys effectively its resources in support of the delivery of the Commission's priorities and core business, has a competent and engaged workforce, which is driven by an effective and gender-balanced management and which can deploy its full potential within supportive and healthy working conditions.	
Indicator 1 (mandatory – data to be provided by DG HR): Percentage of female representation in middle management **Source of data:** SEC(2015)336 and SEC(2015)6033085	
Baseline 31/12/2015 39.6% female middle managers	Target 40 % by 2019
Indicator 2 (mandatory – data to be provided by DG HR): Percentage of staff who feel that the Commission cares about their well-being[14] **Source of data:** Commission staff survey 2014	
Baseline (2014) 29%	Target Increase by 6 points to reach current Commission average (35 %) in next Commission Staff Survey
Indicator 3 (mandatory – data to be provided by DG HR): Staff engagement index **Source of data:** Commission staff survey 2014	
Baseline (2014) 60.3	Target Improve to at least Commission average staff engagement (65.3 in 2014)

DG Research and Innovation will continue to perform its workload assessment and benchmarking exercises (HR Reporting) in order to rebalance the workload of staff according to priorities and with the ultimate goal of achieving an even workload balance among staff. The information coming out of this workload assessment and benchmarking exercise will allow informed decisions on redeployment of staff according to new priorities. Moreover, the results of the benchmarking (comparison of like activities between directorates), enable the DG to identify areas where efficiency gains could be achieved. For DG Research and Innovation the exercise of rebalancing staff workload is especially crucial given the steep taxation of its staff numbers (due to the externalisation of the Horizon 2020 Programme Management), the Commission Staff-Cuts and Commission Redeployment Tax. For staff, if the rebalancing and redeployment exercise is done correctly, it should indirectly positively influence Staff Satisfaction as well as Staff Engagement (Indicators 2 and 3).

On 1 January 2016 female representation at middle management is at 39.6% which is already very close to the target of 40 % and a result of the efforts of past years inter alia via the implementation of the annual Equal opportunities Action Plan of DG RTD which includes these targets. To maintain and exceed this target, DG Research and Innovation has launched in February 2016 as a pilot a specialized campaign of talent management for its female AD staff encouraging talented female colleagues to apply for management posts (Indicator 1). This pilot will be adapted in the context of the overall Talent Management Strategy which will be launched shortly by DG HR to avoid duplication. Gender aspects have already in past years and will also in future be taken into account in HR management. Targets are

[14] This indicator may be replaced by a fit@work index on which DG HR is currently working.

set in the Equal Opportunities Action Plan along with actions and their implementation is monitored and reported back to Senior Management.

Already in 2015, DG Research and Innovation has launched a number of activities for staff well-being which with the launch of have been regrouped under that label after the launch of the fit@work campaign. Amongst there have been activities for physical as well as mental health, e.g. the Walking Campaign, several lunchtime conferences on issues like the benefits of walking, psychosocial risks, sleep and also e-learning information sessions on managing stress and developing resilience or office ergonomics. Moreover, social corners were created as well as water purifiers and dispensers provided in the kitchenettes. These actions will be continued in the coming years with more topics to be added depending on availability of budgets and speakers. Specific sessions for managers on absence management have been rolled out as well as dedicated management café on prevention of burn-out for managers.

DG Research and Innovation also implements a 180° feedback exercise for its middle managers, with a pilot exercise in 2015 and roll-out in 2016.

Finally, Research and Innovation will continue to foster information and opinion exchanges with its staff, notably through one-hour "Staff Seminars". These seminars are organised around specific topics of interest to staff and related to the work of the DG. Management shares information and staff can express their views and bring up ideas (Indicators 2 and 3).

B. Financial Management: Internal control and Risk management

Overarching objective: The Authorising Officer by Delegation should have reasonable assurance that resources have been used in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions including prevention, detection, correction and follow-up of fraud and irregularities.

Objective 1 (mandatory): Effective and reliable internal control system giving the necessary guarantees concerning the legality and the regularity of the underlying transactions

Indicator 1 (mandatory): Estimated residual error rate for grants in Research Framework programmes[15]

Source of data: The Common Audit Service (CAS, Common Support Centre) establishes a ***Common Representative audit Sample*** **(CRaS) for the research framework programmes**. This sample covers expenditure by all the implementing services involved in the programmes. Based on the cumulative results of these representative external audits, the CAS estimates the **Representative Error Rate** for the currently audited framework programme (FP7 until 2017 and Horizon 2020 from 2016). The Estimated Residual Error Rate, on a multi-annual basis, is the extrapolated level of error remaining after corrections/recoveries undertaken by Commission services following the audits that have been made.

Baseline	Target
2014: 3%	As close as possible to 2%

Indicator 1B : Estimated Error Rate for the entire budget under the DG's responsibility[16]

Source of data: The total amount of payments authorised in the year by DG RTD is divided by management type/control system categories. For each chunk of the payments is associated an Estimated **Gross Error Rate**, following the **estimation method** which is **adapted** to the category. The Residual Error Rate is calculated by deducting the "**Corrective capacity of the DG**" provided by the central services from the above Estimated Gross Error Rate.

[15] For the definition, see the first annex to the AAR instructions 2014 "Key definitions for determining amounts at risk" at https://myintracomm.ec.europa.eu/budgweb/EN/rep/aar/Documents/aar-standing-instructions.pdf.

Baseline	Target
2014: 2.80%	As close as possible to 2%
Indicator 2 (mandatory): Estimated overall amount at risk for the year for the entire budget under the DGs responsibility. **Source of data:** Total amount of Payments in ABAC * Representative error rate	
Baseline	Target
2014 : 105 M€	none
Indicator 3 (mandatory): Estimated future corrections **Source of data:** Total amount of Payments in ABAC*Corrective Capacity of the DG	
Baseline	Target (*none*)
2014: 45 M€	none

For grants under FP7, for several years, the Gross Representative Error rate has turned around 5%, reduced to a Residual Error rate of around 3%, after implementation of corrective measures. This framework programme still represents an important part of 2016-2020 payments. Although there are limits to what DG Research and Innovation can do, because the legislation can no longer be changed and contracts have already been signed, it nevertheless continues to undertake relevant training and communication actions to increase the quality and the efficiency of the controls. However, Taking into account the need to balance legality and regularity with other objectives such as the attractiveness and the success of research policy, international competitiveness, scientific excellence, the wish to encourage participation of SMEs and the cost of controls, it is not expected that, for grants, by the end of the FP7 implementation period the Residual Error Rate will be below the materiality threshold.

The Financial Statement accompanying the proposal for Horizon 2020 stated that the representative error rate is expected to decrease from 5% to 3.5%, with the Residual Error Rate being as close as possible to 2%, but without necessarily being below 2%.

DG RTD believes that residual error rates should be reduced under Horizon 2020 as a result of the simplifications introduced in the legislation. However, it underlines that the level of reduction in Horizon 2020 is subject to the effect of elements introduced during the legislation which, although perfectly understandable in terms of improving support for European research and innovation, may have the effect of increasing risks:

- an increased participation of *Small and Medium-Sized Enterprises*, that have an error rate more than twice the rate for non-SMEs (6.61% as opposed to 3.07%);

- a commitment to involving *new participants* in the Programme, which have an error rate nearly three times as high as recurrent participants (8.32% as opposed to 2.94%);

- an additional support to participants with *large research infrastructures*, and which may not receive sufficient support from the flat rate for indirect costs in Horizon 2020, which inserts an additional complication into the rules, and with it an increased risk.

Thus, a target to reach an error rate below the materiality threshold does not seem to be a realistic, neither a cost efficient approach.

Moreover, experience showed that increasing systematic, in-depth controls sharply increases costs and administrative burden, with a lower benefit in terms of reducing error. Increasing controls would then contradict the sound financial management (objective 2) and its cost-effectiveness objectives.

Therefore, Horizon 2020 legislation and business processes invest rather in simplification of the rules, preventive controls such as guidance and information to the beneficiaries, and some targeted

[16] For the definition, see the first annex to the AAR instructions 2014 "Key definitions for determining amounts at risk" at https://myintracomm.ec.europa.eu/budgweb/EN/rep/aar/Documents/aar-standing-instructions.pdf.

controls.

Whereas still very significant for the coming years, the research framework programme is only one element of DG RTDs expenditure. Over time the level of grants in the total expenditure will fall, as much of the Horizon 2020 programme implementation has been delegated to Executive Agencies and Joint Undertakings.

Objective 2 (mandatory): Effective and reliable internal control system in line with sound financial management.	
Indicator 1A (mandatory): conclusion reached on cost effectiveness of controls **Source of data: AAR**	
Baseline (2014)	Target (2016-2020)
Yes	Yes
Indicator 2A: Cost of controls over expenditure **Source of data: DG RTD all staff costs of the year** (housing included)(based on average personnel costs established by the central services)* **% allocated to** Horizon 2020 (+FP7) **grant management** (following the most recent workload estimation exercise available) + **external costs** (experts, external auditors – costs communicated by the relevant services)/**Total amount of payments** authorised in the year by the DG in direct grant management (**ABAC**, analysis by RTD.R2)	
Baseline (2014)	Target
4.26%	Observation period – no target defined
Indicator 1B: conclusion reached on cost effectiveness of controls regarding the research budget entrusted to other programme implementing bodies (Agencies, JU's) **Source of data: AAR**	
Baseline (2014)	Target
Yes	Yes
Indicator 2B: Cost of controls over expenditure DG RTD's dedicated staff (% EFT) * average annual cost of an agent (housing included)(officials and contractuals distinguished) /total amount subdelegated in the reporting year to the relevant entities	
Baseline (2014)	Target
1.07%	Observation period – no target defined
Indicator 1C: conclusion reached on cost effectiveness of controls regarding the financial instruments (INNOVFIN) **Source of data: AAR**	
Baseline (2014)	Target
Yes	Yes
Indicator 2C: Management fees over entrusted budget The total remuneration fees paid (in a cumulative way) to an entity implementing Horizon 2020 budget (financial instruments), compared to the total (cumulative) entrusted budget	
Baseline (year)	Target
2014: 2.8%	Observation period – no target defined

The efficiency of the controls over the implemented budget is an important part of the sound financial management. Reporting started on this aspect in 2013, after the entry into force of the FR 2012. It has to be noted that the associated indicators and the method of estimating their value are expected to evolve in the next years.

The relevance of these indicators is very relative, and there are no standards for the method of calculation nor for the targets to reach. The present strategic period should be seen as an observation period in order to develop the methodology.

The results of DG RTD's indicators will also have to be read with some precautions. DG RTD has a specific position in the research sector, with a number of functions that benefit of the whole research family. As an example, the audit function (part of the overall cost of controls in grant management) is common for all the Horizon 2020 implementing services and is located in RTD. The

costs appear therefore in RTD while the related expenditure is implemented all over the services. This biases DG RTD's indicator.

In general, RTD should be considered not only as a spending DG, but also as a horizontal service, regarding the Research Framework Programmes' implementation.

Objective 3 (mandatory): Minimisation of the risk of fraud through application of effective anti-fraud measures, integrated in all activities of the DG, based on the DG's anti-fraud strategy (AFS) aimed at the prevention, detection and reparation of fraud.		
Indicator 1: Updated anti-fraud strategy of DG RTD and the Research Family[17] **Source of data: DG RTD's AFS; Research Family AFS (RAFS)**[18]		
Baseline	Interim Milestone	Target
RTD AFS: 2012.09.25 RAFS: 2015.04.28	Related action plan implementation	Update every 3-4 years, following the need for adaptation
Indicator 2 (optional): Fraud awareness is maintained for target population(s) as identified in the DG's AFS : Number of agents having participated in DG RTD's AF awareness course **Source of data:** AAR, AFS KPI's : number of participants from DG RTD to the AF course;		
Baseline 2015	Interim Milestone 2017	Target
43[19]	60	60 per year
Indicator 3 (optional): Implementation rate of the RAFS related action plan **Source of data:** AAR, minutes of FAIR committee		
Baseline (2015)	Interim Milestone (2017)	Target (2020)
0%	80% of the 2015 AP	90% of the following AP

DG Research and Innovation shares with the other implementing services of the Research Framework Programmes the main sectorial fraud risks, which are related to fraudulent cost claims in research grant agreements.

Like for other business processes, DG Research and Innovation has taken the lead for the family and coordinates the anti-fraud strategy and actions that are established and implemented in common by the involved services. We can now consider that a common anti-fraud approach is now well established within the Research Family, as it started with FP7 and is deepened for Horizon 2020.

This guarantees not only a better efficiency of some measures, but also increases the chances of the EU services to protect the EU's financial interest against fraudulent beneficiaries, in close cooperation with OLAF.

Training courses are offered by DG Research and Innovation to its own officials, but also to staff from other members of the research family, who are increasingly implementing the framework programme.

[17] The methodology can be found on the FPDNet website: https://myintracomm.ec.europa.eu/serv/en/fraud-prevention/ToolBox/Documents/Methodology%20and%20guidance%20for%20DGs%20anti-fraud%20strategies.pdf. In particular paragraph 3 of the methodology is relevant.

[18] The methodology can be found on the FPDNet website: https://myintracomm.ec.europa.eu/serv/en/fraud-prevention/ToolBox/Documents/Methodology%20and%20guidance%20for%20DGs%20anti-fraud%20strategies.pdf. In particular paragraph 3 of the methodology is relevant.

[19] 129 participants from the wider research family were also trained.

C. Better Regulation (only for DGs managing regulatory acquis)

The Better Regulation Guidelines has reinforced the role of the evaluation in policy making, whilst also continuing requesting that strong attention is paid to assessing impacts of new policy initiatives. The Juncker Commission's focus on 'Budget for Results' demands stepping up the requirements to report on the performance of EU spending programmes and the need to involve Member States in the evaluation activities.

During 2016-2020 DG Research and Innovation will carry out two major evaluations: the interim evaluation of the Horizon 2020 programme and the interim evaluation of the Euratom Research and Training Programme. In line with the Better Regulation Guidelines, the SWD on the Horizon 2020 Interim Evaluation will be submitted to the Regulatory Scrutiny Board 3rd quarter of 2017. The interim evaluation of Horizon 2020 is a mandatory requirement from the Regulation (EU) No 1291/2013 establishing Horizon 2020. The interim evaluation, due by the end of 2017, will consist of a Commission Communication responding to a report of independent experts, and an accompanying Commission Staff Working Document. The interim evaluation of the Euratom programme will be carried out by end of May 2017 in line with the Council Regulation (Euratom) No 1314/2013[20].

The activities during 2016-2020 include the launch of the successor to Horizon 2020 and Euratom Programme. The Euratom interim evaluation will constitute the ex-ante impact assessment required for the prolongation of the Euratom Research and Training Programme for 2019-2020. Regarding the successors to Horizon 2020 and Euratom programme post 2020, it is expected that the preparations for the impact assessment will start at the end of 2016. The ex-ante impact assessments will be submitted to the Regulatory Scrutiny Board in 2018.

Objective (mandatory): Prepare new policy initiatives and manage the EU's acquis in line with better regulation practices to ensure that EU policy objectives are achieved effectively and efficiently.		
Indicator 1 (mandatory – monitored by the DGs concerned): Percentage of Impact assessments submitted by DG Research and Innovation to the Regulatory Scrutiny Board that received a favourable opinion on first submission. ***Explanation:*** *The opinion of the RSB will take into account the better regulation practices followed for new policy initiatives. Gradual improvement of the percentage of positive opinions on first submission is an indicator of progress made by the DG in applying better regulation practices.* **Source of data:**		
Baseline (2013)	Interim Milestone (2016)	Target (2020)
100%	50%[21]	50%[21]

[20] Contrary to Horizon 2020, the maximum duration of the Euratom Research and Training Programmes is fixed to 5 years by Article 7 of the Euratom in the Treaty.

[21] The milestone and the target are lower than the baseline as the average IA resubmission rate in the Commission has been 50% in 2015.

Indicator 2 (mandatory – monitored by the DGs concerned): Percentage of the DG's regulatory acquis covered by ex-post evaluations and Fitness Checks not older than five years.

Explanation: *Better Regulation principles foresee that regulatory acquis is evaluated at regular intervals. As evaluations help to identify any burdens, implementation problems, and the extent to which objectives have been achieved, the availability of performance feedback is a prerequisite to introduce corrective measures allowing the acquis to stay fit for purpose.*

Relevance of Indicator 2*: The application of better regulation practices would progressively lead to the stock of legislative acquis covered by regular evaluations to increase.*

Source of data:

Baseline (2015)	Interim Milestone (2016)	Target (2020)
Percentage of the DG's regulatory acquis covered by ex-post evaluations and Fitness Checks not older than five years. - 100% (related to ex-post evaluations of the previous MFF programmes)	*Positive trend compared to baseline*	*Positive trend compared to interim milestone*

D. Information management aspects

Objective (mandatory): Information and knowledge in your DG is shared and reusable by other DGs. Important documents are registered, filed and retrievable	
Indicator 1 (mandatory – data to be provided by DG DIGIT): Percentage of registered documents that are not filed[22] (ratio) **Source of data:** *Hermes-Ares-Nomcom (HAN)[23] statistics*	
Baseline (1/8/2015)	Target (2016-2020)
3,0%	1,0%
Indicator 2 (mandatory - data to be provided by DG DIGIT): Percentage of HAN files readable/accessible by all units in the DG **Source of data:** *HAN statistics*	
Baseline (1/11/2015)	Target (2016-2020)
61,7%	85%
Indicator 3 (mandatory data to be provided by DG DIGIT): Percentage of HAN files shared with other DGs **Source of data:** *HAN statistics*	
Baseline (1/11/2015)	Target (2016-2020)
0,2%	75%

Overall DG Research and Innovation is already performing well (only 3% of unfiled documents), even if we have to take into consideration that some IT systems file documents automatically. Considering the manual filing only, 10% of documents are unfiled. Training and communication actions will continue to reduce this number. By default RTD files are already readable by all Units in the DG, nevertheless 38% of RTD files have a limited access which was requested by their respective "lead departments" (Units in charge). An analysis of those "limited files" will be made in order to make sure that this limit is really appropriate. During 2017 – 2020 period, efforts will be carried out across the DG, to make sure that the percentage of documents with restricted access in ARES be kept to an absolute minimum, in cases of real and visible sensitivity of information.

More widespread sharing of files is clearly desired, especially among the research DGs, and efforts to this end will be undertaken over the 2016-2020 period.

[22] Each registered document must be filed in at least one official file of the *Chef de file*, as required by the e-Domec policy rules (and by ICS 11 requirements). The indicator is to be measured via reporting tools available in Ares.
[23] Suite of tools designed to implement the e-Domec policy rules.

E. External communication activities

The external communication strategy of DG Research and Innovation is intended to complement the Commission's Corporate Communication campaigns, to which Horizon 2020 contributes as stipulated in Article 28 of the basic act establishing its legal basis.

Specifically actions will highlight the impact that research and innovation has on supporting the following political priorities:

- A New Boost for Jobs, Growth and Investment
- A Connected Digital Single Market
- A Resilient Energy Union with a Forward-Looking Climate-Change Policy
- A Stronger Global Actor

To reflect the fact that research and innovation actions are not just transversal in nature (cutting across, in fact, all ten political priorities) but also increasingly multidisciplinary, leading to outcomes, for example, that can not necessarily be predicted, communication actions will also simultaneously reinforce DG RTD's mission to promote Open Innovation, Open Science and Open to the World.

Performance will be measured in terms of 'reach' and 'engagement' aggregating data from a number of communication platforms and media multipliers such as:

- Social media (e.g. Twitter and Facebook followers)
- Web (Europa website; Horizon Magazine)
- Multimedia (e.g. via the coproduction with Euronews of Futuris R&I)
- Earned media coverage
- Events, exhibitions, awards for excellence and prizes

The objective is to reach beyond the established stakeholder community using concrete examples, story-telling techniques and high-impact infographics. A key message will be to promote awareness of the EU added value arising from the leveraging R&I funding provided by Horizon 2020, its financial instruments and the contribution to the Investment Plan.

Since the model grant agreement now requires that Horizon 2020 beneficiaries also promote their own work (including to the media and the public), a continuous programme of targeted assistance has been set up to provide information, guidance and support material.

Objective (mandatory): Citizens perceive that the EU is working to improve their lives and engage with the EU. They feel that their concerns are taken into consideration in European decision making and they know about their rights in the EU.
Indicator 1 (mandatory – provided in a ready-to-use form by DG COMM): Percentage of EU citizens having a positive image of the EU ***Every DG should aim to contribute to it and, considering its area of work, explain how it aims at enhancing the positive image of the EU.*** *Definition*: Eurobarometer measures the state of public opinion in the EU Member States. This global indicator is influenced by many factors, including the work of other EU institutions and national governments, as well as political and economic factors, not just the communication actions of the Commission. It is relevant as a proxy for the overall perception of the EU citizens. Positive visibility for the EU is the desirable corporate outcome of Commission communication, even if individual DGs' actions may only make a small contribution.

Source of data: Standard Eurobarometer (DG COMM budget) [*monitored by DG COMM here*].	
Baseline: November 2014	Target: 2020
Total "Positive": 39% Neutral: 37 % Total "Negative": 22%	Positive image of the EU ≥ 50%

The focus of DG Research and Innovation external communication actions is on showcasing the positive societal impact of EU funded research and innovation. This is done by identifying appropriate material and ensuring the most widespread dissemination of it. In addition to actions that DG RTD implements directly, it also works with a number of multipliers who use their own networks of communities to spread key messages and news stories. Principal among these are the Futuris research and innovation programmes that are co-produced between the Commission and Euronews and disseminated by the latter via TV broadcasts and digital media. The reach figure for 2014 exceeded 25 000 000.

Objective: Increase the direct reach of DG RTD communication actions **Indicator 1.1 Number of unique visitors to Europa and Horizon Magazine websites and newsletters, Social media follows, and key known multipliers.**	
Baseline: Year end 2014	Target: 2020
Reach: 9 934 000	11 921 000 (20% increase target based on an annual target of 3.0%)

In this context 'direct reach' is defined as the population who have manifested an interest in research and innovation issues either through behaviour (unique visitors to webpages) or choice (social media followers; registration to mailing lists). The data refers only to communication channels directly implemented, administered or contracted (e.g the Horizon Magazine) by DG RTD. The data refers to reaches per platforms (web, Facebook account, twitter account etc.).

Objective: Engagement	
Indicator 1.2 Fan engagement rate	
Baseline: Year end 2014	Target: 2020
Facebook (Horizon 2020): 1.8	35
Facebook (Innovation Union): 4.5	12
Twitter (Horizon 2020): 12	25
Twitter (Innovation union): 5.3	10

Fan engagement rates are extracted using 'engagor', a corporate tool provided by DG COMM. The baseline figures have been extrapolated to 2020 on the basis of estimated growth rates and match or exceed the long-term EC benchmarks supplied by DG COMM. The data for Horizon 2020 magazine is not included due to possible anomalies resulting from 'boosting'.

Objective: Identify, adapt and disseminate examples of successful EU funded research and innovation actions	
Indicator 1.3 Number of news stories put into the public domain	
Baseline: Year end 2014	Target: 2020
Number of unique success stories: 1380 (includes contributions from previous years)	3300 (250 new stories per subsequent year of programme after 2015)

This indicator refers to content that is produced explicitly and edited by external contractors (professional journalists) for the purposes of demonstrating and showcasing concrete examples of successes arising from EU funded research and innovation to a general audience.

Annex to the Strategic Plan (if applicable)

Annex 1. Performance tables

General objective 1: A New Boost for Jobs, Growth and Investment	
Impact indicator: Percentage of EU GDP invested in R&D (combined public and private investment) **Source of the data**: Eurostat	
Baseline (2012)	**Target** (2020) Europe 2020 target
2.01%	3%

Specific objective 1.1: Working with Member States to strengthen Europe's R&I systems and achieve the European Research Area		Related to spending programme(s)
Result indicator: Number of PSF activities (peer-reviews, mutual learning exercises, specific support) **Source of the data:** DG RTD		
Baseline (2015)	**Interim Milestone** **(**2018)	**Target** (2020)
5	10	10

Specific objective 1.2: To establish the right framework conditions to capitalise on the results of European research and innovation by involving all actors in the innovation process ("Open Innovation")		Related to spending programme(s)
Indicator: EU Innovation Output indicator[24] **Source of the data:** DG RTD		
Baseline (2010)	**Interim Milestone** (2017)	**Target** (2020)
100.0	Positive trend	Positive trend
Result indicator: Number of support schemes made available by the countries/regions represented in the Community of Practice to support proposals awarded the Seal of Excellence **Source of the data:** : Information collected through the participants of the Community of Practice *(to be noted that the participants will provide such information on a voluntary base)*		
Baseline (2014)	**Interim Milestone** (2017)	**Target** (2020)
3	10	20

[24]The Innovation Output Indicator was developed by the Commission at the request of the European Council to benchmark national innovation policies and to monitor the EU's performance against its main trading partners. It measures the extent to which ideas stemming from innovative sectors are capable of reaching the market, providing better jobs and making Europe more competitive. The proposed new indicator covers technological innovation, skills in knowledge-intensive activities, the competitiveness of knowledge-intensive goods and services, and the innovativeness of fast-growing enterprises. It complements the R&D intensity indicator (3% target of the Europe 2020 strategy) by focusing on innovation output. It will support policy-makers in establishing new or reinforced actions to remove bottlenecks preventing innovators from translating ideas into successful goods and services.

Specific objective 1.3: To ensure an effective and efficient implementation of Horizon 2020 and other RTD programmes and maximise synergies	Related to spending programme(s) Horizon 2020, Euratom Research and Training Programme, Research Fund for Coal and Steel

Result indicator: Share of grants signed with a time-to-grant within 245 days (Horizon 2020-DG RTD)
Source of the data: Common Support Centre

Baseline (2014)	**Interim milestone** (2018)	**Target** (2020)
95%	100%	100%

Output indicator: Share of newcomers among the successful applicants (Horizon 2020 – DG RTD)

Baseline (FP7, 2013-2017)	**Interim milestone** (2018)	**Target** (2020)
70%	55%	>70% *(on the basis of FP7 results)*

Result indicator: Publications in peer-reviewed high impact journals in the areas of the different Societal Challenges (Horizon 2020-DG RTD)
Source of the data: Common Support Centre

Baseline (at the start of Horizon 2020)	**Interim Milestone** (2018)	**Target** (2020)
New approach under Horizon 2020	On average, 20 publications per €10 million funding (for all Societal Challenges)	On average, 20 publications per €10 million funding (for all Societal Challenges)

Result indicator: Patent applications and patents awarded (Horizon 2020-DG RTD)
Source of the data: Common Support Centre

	Baseline (at the start of Horizon 2020)	**Interim Milestone** (2018)	**Target** (2020)
Societal challenges	New approach under Horizon 2020	On average, 2 per €10 million funding	On average, 2 per €10 million funding
Enabling and Industrial Technologies	New approach under Horizon 2020	3 patent applications per € 10 million funding	3 patent applications per € 10 million funding

Result indicator: Share of publications from ERC-funded projects which are among the top 1% highly cited per field of science (defined as an index[25])
Source of the data: ERCEA

EU baseline (2010)	**Interim Milestone** (2018)	**Target** (2020)
New approach	1.5	1.8 *The target "doubles" the performance of EU based researchers in the top percentile of world highly cited articles. It is based on the challenging assumption that the ERC supported researchers are at the top of the class and should perform 100% better*

[25] In order to facilitate comparison of reference values between the EU and other parts of the world (published regularly in the US Science and Engineering indicators), the share of publications from the ERC will also be indicated by means of the "index of ERC highly-cited publications". A value higher than 1 indicates that publications from ERC-funded projects are cited at a level above what one would expect, a value lower than 1 indicates citation at a level below the expected value and a result of 1 corresponds to the expected value.

		than an average researcher from EU, with respect to the record in the world top 1% of highly cited articles.

Result indicator: Total investments mobilised via debt financing and Venture Capital investments
Source of the data: EIB

Baseline (2013)	**Interim Milestone** (2017)	**Target** (2020)
New approach	€ 8 billion	€ 25 billion

Result indicator: Growth and job creation in participating SMEs (Horizon 2020 – DG RTD)
Source of the data: Common Support Centre

Baseline	**Interim Milestone**	**Target**
New approach under Horizon 2020	To be developed based on FP7 ex-post evaluation and/or first Horizon 2020 project results	To be developed based on FP7 ex-post evaluation and/or first Horizon 2020 project results

Result indicator: Total amount of funds leveraged through Article 187 initiatives managed by DG RTD, including additional activities, divided by the EU contribution
Source of the data: Joint Undertakings

Baseline (FP7)	**Interim Milestone** (2016)	**Target** (2020)
1.00 (€2.27 billion for €2.27 billion of EU contribution from FP7)	0.84	1.39 (€7.013 billion for €5.033 billion of EU contribution from Horizon 2020) - On the basis of the financial contribution foreseen in the Regulation establishing each one of the PPPs

Result indicator: Share of EU financial contribution -DG RTD[26] allocated to SMEs; of which share of funds allocated through the SME instrument
Source of the data: Common Support Centre

	Baseline	**Milestone** (2016)	**Target** (2020)
SMEs – SME instrument	New approach	5%	7% *(Horizon 2020 mandatory target)*
SMEs - total	17.2% (June 2013)	20%	20% *(Horizon 2020 mandatory target)*

Result indicator: Share of EU financial contribution – DG RTD[27] going to private for profit entities
Source of the data: Common Support Centre

Baseline (FP7 – October 2013)	**Interim Milestone** (2016)	**Target** (2020)
29.2%	33%	33% *(On the basis of FP7 results and Horizon 2020 mandatory target for SMEs)*

[26] Total combined budgets for all Horizon 2020-DG RTD specific objectives on societal challenges and the components of the specific objective 'Leadership in enabling and industrial technologies'.

[27] Total combined budgets for all Horizon 2020-DG RTD specific objectives in Industrial Leadership (excluding "Access to Risk Finance") and Societal Challenges.

Result indicator: Share of the RFCS funds going to private for profit entities **Source of the data: DG RTD**		
Baseline (2013)	**Interim Milestone** (2016)	**Target** (2020)
38.9%	40%	40% *(on the basis of the previous MFF (2007-2013)*

Planned evaluations:

- Evaluation, monitoring and comparison of the impacts of EU funded SSH (Socio-economic sciences and Humanities) research in Europe (IMPACT-EV project), 2017
- Ex-post evaluation of the Health theme in FP7, 2016, FP7
- Evaluation of Health research under FP6 and FP7, In-depth case studies, 2016, FP6-FP7
- Stock taking & meta-analysis of Science in Society projects throughout FP6 and FP7, 2017, FP6-FP7
- Evaluation of Joint Programming to address Grand Societal Challenges, 2016, Horizon 2020
- Evaluation of the operation of ERCEA (2012-2015), 2016
- Evaluation of the operation of REA (2012-2015), 2016
- Assessing the European Added Value and the economic impact of FP7 and Horizon 2020, 2016, FP7-Horizon 2020
- Analysis of ERA-NET Cofund actions under Horizon 2020, 2016, Horizon 2020
- Evaluating the uptake and impact of Member State participation in the Framework Programmes for Research, 2016, FP6-FP7-Horizon 2020
- Evaluation study on Horizon 2020 Research Infrastructures, Horizon 2020
- Evaluation study on Horizon 2020 LEIT NMBP, 2016, Horizon 2020
- Providing information and expertise for monitoring the Horizon 2020 LEIT-NMBP, 2017, Horizon 2020
- Ex post impact assessment of the FP7 NMP Theme, 2017, FP7
- Interim evaluations of Horizon 2020 Financial Instruments and Facilities, Horizon 2020
- Interim Evaluation of Horizon 2020 - Societal Challenge 2. Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy, 2017, Horizon 2020
- Interim Evaluation of Horizon 2020 - Societal Challenge 4. Smart, green and integrated transport, 2016, Horizon 2020
- Interim Evaluation of Horizon 2020 - Societal Challenge 5: Climate Action, environment, resource efficiency and raw materials, 2016, Horizon 2020
- Interim evaluation of IMI Joint Undertaking, 2017, Horizon 2020
- Interim evaluation of BBI Joint Undertaking, 2017, Horizon 2020
- Interim evaluation of Clean Sky Joint Undertaking, 2017, Horizon 2020
- Interim evaluation of FCH Joint Undertaking, 2017, Horizon 2020
- In-depth assessment of the FTI, Horizon 2020
- Interim evaluation of EDCTP2, 2017, Horizon 2020
- Interim evaluation of EMPIR, 2017, Horizon 2020
- Interim evaluation of Eurostars2, 2017, Horizon 2020
- Metaevaluation Art.185, 2018, FP7-Horizon 2020
- Final evaluation Eurostars, Horizon 2020
- Final evaluation EMRP, 2017, Horizon 2020
- Final evaluation BONUS, 2017, Horizon 2020
- Ex post impact assessment of LEIT NMBP, Horizon 2020
- Interim evaluation of Horizon 2020, 2017, Horizon 2020

General objective 2: A Connected Digital Single Market	
Impact indicator: Aggregate score in Digital Economy and Society Index (DESI) EU-28 **Explanation:** DESI is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. The closer the value is to 1, the better. The DESI index is calculated as the weighted average of the five main DESI dimensions: 1 Connectivity (25%), 2 Human Capital (25%), 3 Use of Internet (15%), 4 Integration of Digital Technology (20%) and 5 Digital Public Services (15%). **Source of the data**: DESI	
Baseline (2015)	**Target** (2020)
0.478	Increase

Specific objective 2.1: To increase impact and excellent science through openness ("Open Science")	Related to spending programme(s) Horizon 2020

Result indicator: % researchers based in Europe connect/use the upcoming European Open Science Cloud **Source of the data:** Eurostat		
Baseline	**Interim Milestone** (2020)	**Target** (2025)
New approach	30%	80 %

Result indicator: Share of Open access articles (resulting from Horizon 2020 funded research) published in peer reviewed journals **Source of the data:** Common Support Centre		
Baseline	**Interim Milestone** (2017)	**Target** (2020)
New approach	100%	100%

General objective 3: A Resilient Energy Union with a Forward-Looking Climate-Change Policy	
Impact indicator: Greenhouse gas emissions (index 1990=100) **Source of the data**: European Environmental Agency	
Baseline (2013)	**Target** (2020) Europe 2020 target
80.2	At least 20% reduction (index ≤80)

Impact indicator: Share of renewable energy in gross final energy consumption **Source of the data**: Eurostat			
Baseline (2013)	**Interim Milestone**		**Target** (2020) Europe 2020 target
	(2015/2016)	(2017/2018)	
15%	13.6%	15.9%	20%

Impact indicator: Increase in energy efficiency – Primary energy consumption **Source of the data**: Eurostat	
Baseline (2013)	**Target** (2020) Europe 2020 target
1 566.5 million tonnes of oil equivalent (Mtoe)	20% increase in energy efficiency (No more than 1 483 Mtoe of primary energy consumption)
Impact indicator: Increase in energy efficiency – Final energy consumption **Source of the data**: Eurostat	
Baseline (2013)	**Target** (2020) Europe 2020 target
1 104.6 million tonnes of oil equivalent (Mtoe)	20% increase in energy efficiency (No more than 1 086 Mtoe of final energy consumption)

Specific objective 3.1: To implement the Research, Innovation and Competitiveness dimension of the Energy Union, together with a forward-looking climate-change policy		Related to spending programme(s) Horizon 2020
Result indicator: Share of the overall Energy challenge funds allocated to the following research activities: renewable energy, end-user energy-efficiency, smart grids and energy storage activities (DG RTD) **Source of the data:** Common Support Centre		
Baseline	**Interim Milestone** (2016)	**Target** (2020)
New approach	85%	85% *(Horizon 2020 mandatory target)*
Result indicator: Climate-related expenditure (Horizon 2020-DG RTD) **Source of the data:** Common Support Centre		
Baseline	**Interim Milestone** (2017)	**Target** (2020)
New approach	>35%	>35%
Result indicator: Sustainable development-related expenditure (Horizon 2020-DG RTD) **Source of the data:** Common Support Centre		
Baseline	**Interim Milestone** (2017)	**Target** (2020)
New approach	60%	60%
Result indicator: Number of projects contributing to the development of safe long-term solutions for the management of ultimate nuclear waste (Euratom – Fission) **Source of the data:** Common Support Centre		
Baseline (2007-2013)	**Interim Milestone** (2016)	**Target** (2018)
15	5	8[28]

[28] The target figure is lower than the baseline due to the larger average size of the projects expected in the Euratom Research and Training Programme (2014-2018).

Result indicator: Number of publications in peer-reviewed high impact journals (Euratom – Fusion) **Source of the data:** Common Support Centre		
Baseline (2010)	**Interim Milestone** (2016)	**Target** (2018)
800 (FP7)[29]	600	800
Result indicator: Patent applications on the basis of research activities supported by the Euratom Programme (average per year) **Source of the data:** Common Support Centre		
Baseline (2007-2013)	**Interim Milestone** (2016)	**Target** (2018)
2-3	2-3	4
Result indicator: Level of investment in energy research and innovation (both public and private sectors)[30] **Source of the data:** JRC		
Baseline	**Interim Milestone**	**Target**
New approach	Not yet set	Not yet set
Result indicator: Trends in patents[30] **Source of the data:** JRC		
Baseline	**Interim Milestone**	**Target**
New approach	Not yet set	Not yet set
Result indicator: Number of researchers active in the energy sector[30] **Source of the data:** JRC		
Baseline	**Interim Milestone**	**Target**
New approach	Not yet set	Not yet set
Planned evaluation: ➢ Interim evaluation of Euratom Research and Training Programme (2014-2018), 2017, Euratom		

General objective 4: A Stronger Global Actor		
Impact indicator: GDP per capita (current prices-PPS) as % of EU level in countries that are candidates or potential candidates for EU accession **Source of the data**: Eurostat		
Baseline (2014)	**Interim Milestone** (2017)	**Target** (2020)
32.53% for Western Balkans (except Kosovo[1]: no 2014 data available for Kosovo.) 55.52% for Turkey	38% for Western Balkans 60% for Turkey	43% for Western Balkans 65% for Turkey

[29] The baseline figure refers to peer review publications counted under FP7. This indicator under Euratom FP7 cannot be directly compared with the new indicator for Euratom Programme 2014-18. The new indicator covers only peer reviewed articles concerning implementation of the fusion research roadmap, while the old indicator concerns all peer reviewed articles published by fusion labs.

[30] This indicator was announced in the Integrated SET Plan Communication and will be reported in the R&I part of the State of the Energy Union from 2016 onwards. No target has yet been set.

Specific objective 4.1: To translate Europe's strengths in science and technology into a leading global voice ("Open to the World")		Related to spending programme(s) Horizon 2020
Result indicator: Proportion of EU co-publications with at least one International Partner Country to the total of EU publications **Source of the data:** Science Matrix based on Scopus database		
Baseline (2013)	**Interim Milestone** (2018)	**Target** (2020)
36%	38%	40%
Result indicator: Share of third-country participants in Horizon 2020-DG RTD **Source of the data:** Common Support Centre		
Baseline (December 2013)	**Interim Milestone** (2018)	**Target** (2020)
5.7%	7%	10%