



2015

Annual Activity Report

**Directorate-General
for Research
and Innovation**



Foreword

This Annual Activity Report (AAR) covers the activities of the Commission's Directorate-General for Research and Innovation (DG RTD) in 2015.

In 2015, DG RTD continued to develop and implement policies and initiatives aimed at boosting research and innovation in the EU and optimising its impact in order to contribute to jobs and growth and the resolution of societal challenges. This comprised work aimed at establishing the right framework conditions for research and innovation and at increasing investment in research and innovation, including through the implementation of Research and Innovation Framework Programmes (FPs) primarily the Seventh Framework Programme (FP7) and Horizon 2020.

DG RTD also continued to seek ways to make better use of human resources and new management modes. In this way, DG RTD continued with its stated aim of becoming more policy-oriented, and focussing on core institutional tasks, while guaranteeing the most effective and efficient implementation of spending programmes.

Part 1 of this report sets out the policy achievements of the DG and gives an idea of the wide range of activities being carried out in the DG and how they contribute to the research landscape, to the provision of growth, jobs and investment, the Digital Single Market (DSM), the Energy Union and the EU's global action.

Part 2 gives information on the management of the resources allocated to the DG, and on the way the DG gathers assurance on their use. These sections explain the control system and its performance, with such indicators as the error rates found for the projects that we fund, the opinion of different audit services or the costs and benefits of the different stages of the grant management.

The report gives an overview of the DG's operations and helps in understanding the different challenges that are faced. For more information please see our website:

<http://ec.europa.eu/research/index.cfm>

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Director-General
DG RTD

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INTRODUCTION

The DG in brief

DG RTD defines and implements European research and innovation (R&I) policy with a view to reinforcing the science and technology base, promoting innovation and turning societal challenges into innovation opportunities that will help deliver on the European Commission priorities. The DG's long-term objective is to make Europe a better place to live and work, by developing and implementing R&I policy to improve Europe's competitiveness, boost its growth, create jobs and tackle the main current and future societal challenges.

The DG contributes to the Commission's priorities¹ for growth, jobs and investment, the DSM, the Energy Union and global action. In order to maximise the contribution of R&I to these priorities, the Commissioner for Research, Science and Innovation Carlos Moedas has grouped R&I activities under three lead objectives called the three "O's":

- Open Innovation – working with Member States to strengthen Europe's R&I systems and achieve the European Research Area, and establishing the right framework conditions for innovation in Europe;
- Open Science – ensuring excellent science and open access to results and ensuring that Europe benefits from the digital age to drive innovation;
- Open to the World – ensuring that Europe's strengths in science and technology allow it to become a leading global actor.

Horizon 2020, the FP for R&I (2014-2020), is designed to deliver on European research and innovation policy objectives. As the DG continues to strengthen its role as a policy-oriented DG, it concentrates increasingly its involvement in Horizon 2020 on policy-related activities (e.g. definition of work programmes, coordination of the Research family of DGs, etc.) while reducing its direct involvement in contract management (e.g. calls, contract finalisation, payments, etc.). Many of the implementation functions related to Horizon 2020 have now been delegated to the Executive Agencies, Joint Undertakings (JUs) and 'Article 185 initiatives'.

The year in brief

In 2015, DG RTD contributed to the Commission's jobs, growth and investment priorities by working with Member States to strengthen Europe's R&I systems. Within the context of the European Semester, DG RTD ensured that all Country Reports integrated substantial and pertinent analyses of each Member State's R&I system, with a clear identification of the main R&I challenges and an assessment of the policy responses to the challenges, followed up with in-depth dialogues with Member States.

This approach led to the identification of a number of issues to be addressed with the help of the Horizon 2020 on of which was the Policy Support Facility (PSF). The PSF is foreseen to improve the design, implementation and evaluation of R&I policies and, specifically, to offer expert advice to public authorities. A peer review for Bulgaria, a pre-peer review for Hungary and a mutual-learning exercise on policies to stimulate business R&I investment were concluded in 2015.

¹ "A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change, Political Guidelines for the next European Commission" and "Opening Statement in the European Parliament Plenary Session".

DG RTD also worked to achieve a European Research Area (ERA) in which researchers, scientific knowledge and technology circulate freely, notably by working with Member States towards Council Conclusions adopted in May 2015 on the ERA Roadmap² and on the development of ERA National Action Plans due by mid-2016.

The DG's work to establish the right framework conditions to capitalise on the results of European research and innovation also contributed to the Commission's jobs, growth and investment priorities. In 2015, DG RTD developed a Commission Staff Working Document on "Better regulations for innovation-driven investment at EU level"³.

A new Scientific Advice Mechanism (SAM) was established, along with the selection of a high level group of seven scientific advisors. The intention is to provide 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.

In order to improve synergies between Horizon 2020 and European Fund for Strategic Investments (EFSI), DG RTD launched the Seal of Excellence, a quality label awarded to project proposals that succeeded in passing all of the stringent Horizon 2020 selection and award criteria but could not be funded under the available Call budget in order to provide them with better access to the Structural Funds. In addition, the DG undertook preliminary work towards the possible establishment of a Fund of Funds, which would ease the problem of access to finance for innovative SMEs, and a European Innovation Council, which would assist innovators in developing and scaling-up disruptive innovations.

DG RTD was closely involved in the development and adoption of the Circular Economy package, seeing that the innovation dimension was mainstreamed throughout the Communication⁴. Actions to be implemented under the Horizon 2020 Focus Area "Industry 2020 in the Circular Economy", a pilot on Innovation Deals and the launch of a platform together with EIB and national banks to support the financing of circular economy were also included.

Another contribution was made to the Commission's DSM priority by striving to increase impact and excellence science through openness and linking the digital age to innovation. The DG was active in developments related to the DSM, for example on the science cloud, open access to research data and results, copyright legislation and intellectual property.

Work with the Member States led to the adoption of the Council Conclusions on Research Integrity⁵ in December 2015. Preparations were made to combine the thematic priorities of societal challenge areas (particularly health, bioeconomy, energy, transport and eco-innovation) with new and emerging technologies and infrastructures. This will be reflected in the Horizon 2020 2016-2017 work programme, especially in the establishment of demonstrators and prototypes.

DG RTD was strongly involved in the development and publication of the Strategic Energy

² *Council conclusions on the European Research Area Roadmap 2015-2020* (doc. 9351/15 RECH 181 COMPET 286 MI 354 TELECOM 133).

³ SWD(2015)298.

⁴ *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the loop – An EU action plan for the Circular Economy*, COM(2015) 614, 02.12.2015.

⁵ *Research integrity – Council conclusions (adopted on 01/12/2015)* (doc. 14853/15 RECH 296).

Technology Plan (SET Plan) as part of the Commission priority to establish a resilient Energy Union with a forward-looking climate policy. The SET Plan now includes a strong R&I component. Preliminary work is now underway for an integrated strategy on research, innovation and competitiveness.

Third country participation in Horizon 2020 (see below) helps make the EU become a stronger global actor, another Commission priority. Horizon 2020 Association agreements were signed with the Ukraine and Tunisia, a Science and Technology (S&T) Agreement with Mexico was renewed and implementing arrangements were signed and co-funding mechanisms agreed with a number of countries. In the field of science diplomacy, many actions were undertaken, including initiatives with respect to migration and work on an Article 185 initiative on food and water around the Mediterranean (PRIMA). DG RTD also contributed to a number of multilateral fora including the Intergovernmental Panel on Climate Change (IPCC), the Arctic Council and COP21.

A key cross-cutting objective for DG RTD is to ensure the effectiveness and efficient implementation of FP7, Horizon 2020, EURATOM and the Research Fund for Coal and Steel (RFCS), which underpin activities contributing to all of the aforementioned Commission priorities. Highlights are as follows.

FP7

The ex post evaluation of FP7 was undertaken mostly in 2015 and published in early 2016 involving stakeholder, Member States and independent experts. The achievements and impacts of FP7 were examined, clearly demonstrating the added value of the EU research programme.

The results show that FP7 contributed to increasing the competitiveness of Europe's industry and had a positive impact on growth and jobs. It was particularly effective in strengthening scientific excellence, it trained and involved leading international scientific and technological talent and it contributed to increasing the level of research investment. In addition, FP7 addressed transnational European societal challenges which could not have been addressed by Member States acting alone. FP7 ensured additionality, meaning that only a small minority of projects would have gone ahead in its absence. The findings of the evaluation have provided valuable information that will feed in to the interim evaluation of Horizon 2020 ensuring continuity between evaluation and programme design.

The implementation of FP7 continued in 2015 (in parallel with the implementation of Horizon 2020). The cumulative total of grant agreements for the parts of FP7 implemented by DG RTD at the end of the year stood at 6 579 of which a total of 3 824 had their final report approved.

Horizon 2020

By the end of 2015, 198 calls with a submission deadline by that date had been published for Horizon 2020. For these calls, a total of 78 268 proposals have been received, 10 658 of which were put on the main or reserve list. This means a success rate of around 14%, taking into considering only the eligible proposals. In the same period, 8 832 grant agreements were signed with beneficiaries, 528 of which signed by DG RTD.

Meanwhile, a new Horizon 2020 Work Programme was adopted for the years 2016-17. It proposes to invest almost EUR 16 billion in R&I through funding opportunities such as calls for proposals, public procurement and actions like the Horizon prizes. Covering nearly 600 topics, the Work Programme's structure reflects the overall flexibility of Horizon 2020. While focussing on the EU's long-term priorities and the most pressing societal challenges, it also allows for the swift address of emerging problems. Initiatives supported will include modernisation of the manufacturing industry, technologies and standards for automatic driving, the Circular Economy and Smart and Sustainable Cities.

A major research effort was made in 2014 into the Ebola virus, in particular the publication of calls for proposals and the selection of projects for funding in record time. The experience of the Ebola call allowed the DG to move forward quickly with preparations for a call in 2016 for proposals for research the Zika virus.

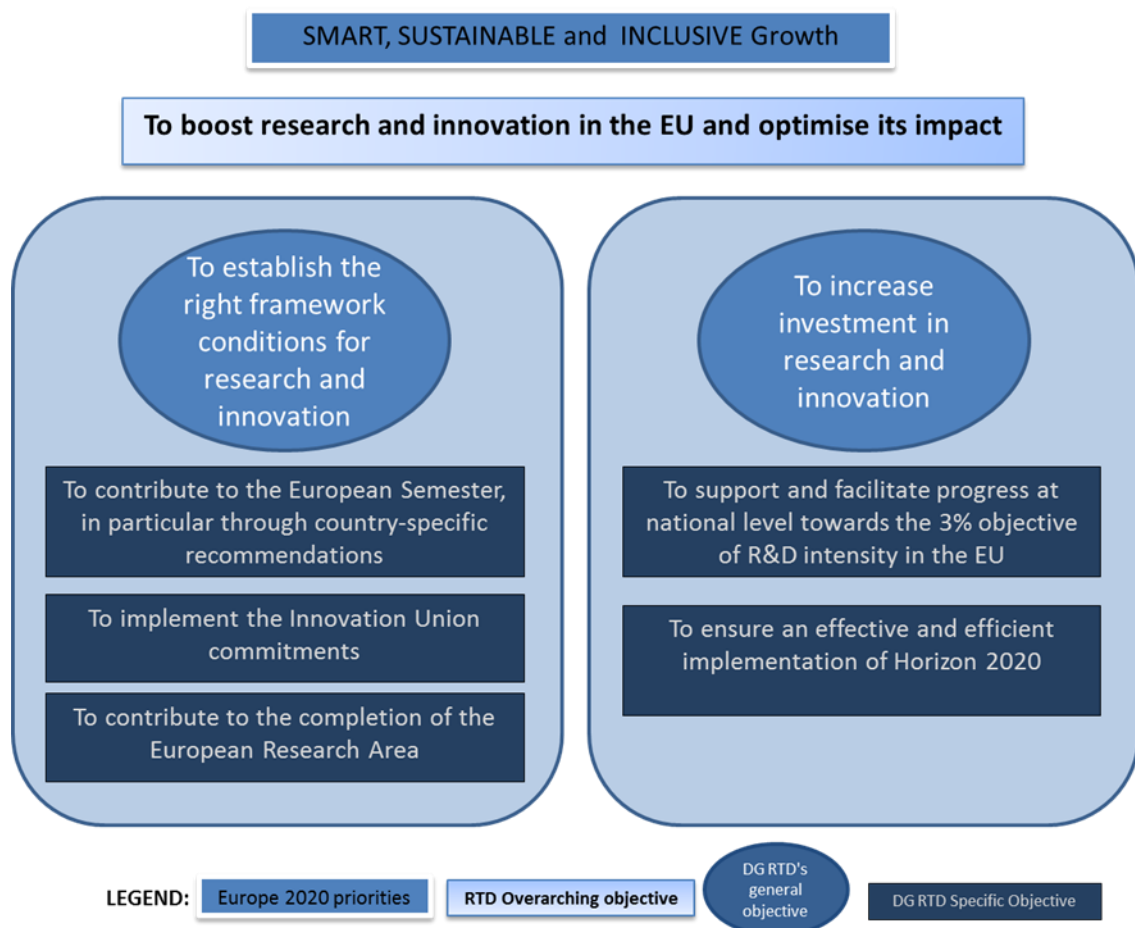
EXECUTIVE SUMMARY

The AAR is a management report of the Director-General of DG RTD to the College of Commissioners. It is the main instrument of management accountability within the Commission and constitutes the basis on which the Commission takes its responsibility for the management of resources by reference to the objectives set in the management plan and the efficiency and effectiveness of internal control systems, including an overall assessment of the costs and benefits of controls.

Policy highlights of the year

DG RTD makes its strongest contribution to four of the Juncker 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" and "A Stronger Global Actor". They will serve as the DG's new General Objectives in its new five-year Strategic Plan and as from the 2016 Management Plan (MP).

However, this AAR will reflect the structure of the MP 2015, using the General and Specific Objectives scheme set out in that document. This structure is set out in the following diagram:



This section reports on the progress made in 2015 towards the achievement of these General and Specific Objectives.

- Specific Objective 1 – To contribute to the European Semester, in particular through country-specific recommendations. A new approach to the European Semester now links country-specific recommendations to the key priority issues of macroeconomic and social relevance that require addressing in the near term. R&I is monitored in country reports.

- Specific Objective 2 – To implement the Innovation Union commitments. All Innovation Union commitments have been delivered or are in the process of being delivered.
- Specific Objective 3 – To contribute to the completion of the European Research Area. The latest developments in ERA policy and Open Science and Open Innovation were discussed in the "Opening up to an ERA of innovation" conference in June. Specific initiatives included the EU Prize for Women Innovators and EURAXESS.
- Specific Objective 4 – To support and facilitate progress at national level towards the 3% objective of R&D intensity in the EU. The achievement of this objective, which is considered to be very challenging in the prevailing financial circumstances, depends mainly on the efforts of the Member States. However, the Commission has been active in this regard, first, through implementation of Horizon 2020 (see below) and, second, through activities intended to leverage funds such as JUs, Public-Private Partnerships (PPPs) and access to risk finance. These funds include both public (national and regional) and private funds.
- Specific Objective 5 – 'To ensure an effective and efficient implementation of Horizon 2020. It is too early to interpret any results for the multiannual indicators in the implementation of Horizon 2020 related to the achievement of Specific Objective 5, 'To ensure an effective and efficient implementation of Horizon 2020'. However, the results for the annual output indicators show that the FP has had a good second year. The calls were published as planned with almost all topics covered and the Work Programme for 2016-17 was adopted. Meanwhile, the ex-post evaluation of the FP7, required by legislation to be carried out within two years of the completion of the FP7⁶, was concluded and published in early 2016.

Ensuring an effective and efficient implementation of Horizon 2020 will be largely achieved through greater resources made available for new management modes including Executive Agencies and Joint Undertakings. This will allow the DG to focus more its efforts on policy activities which are crucial to ensure that Research and Innovation is supported across Europe.

Further details on the progress made in 2015 in achieving these objectives are included in Part 1.

⁶ Art. 7(3) of Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013) (OJ L 412, 30.12.2006, p. 1).

Key Performance Indicators

Result/Impact indicator	Trend	Target (2020)	Latest results											
3% of the EU's GDP to be invested in R&D	▲	3%	2.03% (2014) ⁷											
	<table><caption>R&D investment as a percentage of EU GDP</caption><thead><tr><th>Year</th><th>Percentage</th></tr></thead><tbody><tr><td>2010</td><td>1.93%</td></tr><tr><td>2011</td><td>1.97%</td></tr><tr><td>2012</td><td>2.01%</td></tr><tr><td>2013</td><td>2.03%</td></tr><tr><td>2014</td><td>2.03%</td></tr></tbody></table>			Year	Percentage	2010	1.93%	2011	1.97%	2012	2.01%	2013	2.03%	2014
Year	Percentage													
2010	1.93%													
2011	1.97%													
2012	2.01%													
2013	2.03%													
2014	2.03%													
The EU Innovation Output Indicator	▲	— ⁸	103.6 (2015) 101.6 (2012) 101.7 (2011) 100.0 (2010)											
Progress in the implementation of the Innovation Union commitments	—	34 out of 34	34 out of 34 (2015) 34 out of 34 (2014) 34 out of 34 (2013) 28 out of 34 (2012)											
Share of Horizon 2020 funds allocated to SMEs ⁹	▲	20.0%	23.4% (2015) 19.2% (2014)											
Share of grants signed with a time-to-grant within 245 days (8 months)	▼	100%	93% (2015) ¹⁰ 95% (2014)											

The first Key Performance Indicator (KPI) and the related target – a gross expenditure of 3% of GDP on R&D – is also one of the five headline targets of Europe 2020. Recent upward revision of GDP rates means that the results for the last few years are all lower. However, the overall trend is unchanged: there is a small year-on-year improvement, but achieving the 2020 target will still be challenging¹¹.

⁷ Source: Eurostat provisional estimate.

⁸ The composite nature of this indicator is not particularly suited to establishing a target.

⁹ From the total combined budgets for the specific objective 'Leadership in enabling and industrial technologies' and the priority 'Societal challenges'.

¹⁰ Source: e-Corda TTG reporting.

¹¹ See *Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth* (COM(2014) 130, 5.3.2014).

The second KPI is the innovation output indicator which was delivered in 2013 as one of the Innovation Union commitments. The latest result is from 2015 where, as a whole, there was a slight improvement in the EU's performance by 3.6 points since 2010.

The third KPI concerns the progress made in delivering on the Innovation Union commitments. By mid-2014 all commitments had either been achieved or were on track. The result for the fourth indicator, on the EU contribution provided to Small- and Medium-sized Enterprises (SMEs) through Horizon 2020, increased in 2015 and, the same level of performance be maintained over the coming years, should see the target being achieved.

The new Horizon 2020 Regulation commits the Commission to a combined maximum of eight months with regards to the Time-to-grant (defined as the period between the call deadline and the signature of the grant agreement). Of these eight months, a maximum of five months is established to inform applicants on the results of the evaluation result of their proposal. In the case of DG RTD, 100% of the beneficiaries were informed on time (Time to inform < 5 months) and 93% of the grants were signed within 8 months. This is an excellent result, and a major step forward from FP7.

Getting results from the EU's R&I policies and funding

The overarching objective of EU support for R&I is the achievement of impact. 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.

President Juncker has stated that "every action we take must deliver maximum performance and value added". To this end, EU support for R&I is provided only when it can be more effective than national funding. This is achieved through implementing transnational collaborative research and mobility actions and coordination measures.

In implementing R&I projects, the EU support 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. The cross-border, cross-sectorial, inter-disciplinary networks created in this way are durable, well-structured, and well-integrated into global innovation networks. FP7 has created over 600,000 collaborative links between research-performing institutions in EU Member States.

Working in transnational consortia helps firms to lower R&I risks and encourages them to invest more of their own funds than they would otherwise under national schemes. Companies can collaborate more easily with foreign partners and end-users in projects tested for excellence and market impact. It also facilitates the development of standards and interoperable solutions and the defragmenting of existing markets.

Collaborative research projects involving end-users enable the rapid and wide dissemination of results leading to better exploitation and a larger impact. Together with cross-border mobility and training actions, it provides 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.

EU initiatives also help coordinate funding across national borders and restructure the R&D and innovation landscape in Europe. For instance, the EU has established 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).

Private companies are helped to come together and implement joint strategic research

agendas through tailored instruments, such as European Technology Platforms and Joint Technology Initiatives (JTIs). The EU brings together compartmentalised national research funding using instruments such as the ERA Networks (ERA-NETs) and Article 185 initiatives, which set common agendas and achieve the funding scale required for tackling important societal challenges.

The Commission, together with other actors in the budget process, has the responsibility to make sure every euro is spent effectively and serves the intended purpose. The evidence from interim and ex-post evaluations on the results and impacts produced by EU FPs for R&I through value-added actions is substantial.

The ex-post evaluation of FP7¹² has clearly demonstrated that the programme is already generating great added value compared to national and regional programmes. It is already having large-scale economic, social and environmental impact even though a large number of FP7 projects still remain to be completed and research inevitably takes time to be translated into concrete new products, processes and services.

FP7 accounts for a relatively small part of public research and innovation expenditure in Europe but its macro-economic impacts are substantial. The FP7 ex-post evaluation estimates that, through direct and indirect economic effects, FP7 will increase the EU's GDP by approximately EUR 20 billion per year over the next 25 years, for a total of EUR 500 billion.

FP7 contributed effectively to increasing the level of research investment. Through short-term leverage effects and long-term multiplier effects, each euro spent by FP7 will generate approximately EUR 11 of estimated direct and indirect economic effects through innovations, new technologies and products. The evaluation also estimates that FP7 sustains over 130 000 research jobs directly over a period of 10 years and 160 000 additional jobs indirectly over a period of 25 years.¹³

FP7 strengthened the competitiveness of Europe's industry. The macro-economic effects are driven by micro-economic effects at the company and institutional level including enhanced competitiveness, increased turnover and job creation based on the introduction of new products, processes and services new to the company or new to the market. Completed FP7 projects have produced more than 7 428 commercial exploitations, 2 266 intellectual property rights (IPR) and 1 742 patent applications.¹⁴

Many FP7 participants were SMEs. According to the FP7 ex-post evaluation, FP7 engaged SMEs strategically, with funding of around €6.4 million, well above the 15% target for the FP7 cooperation programme. Results of econometric analyses show that SMEs participating in the FP7 scored 38% higher than the control group with regard to employment growth and operating revenue.

FP7 JTIs and other PPPs leveraged private funding and boosted the involvement of industry to implement comprehensive strategic research agendas and secure the future competitiveness of key European industries like pharmaceuticals, aeronautics and fuel cells and hydrogen. The Risk-Sharing Finance Facility (RSFF) improved access to loan finance for research and innovation-focused companies through loan agreements worth EUR 11.3 billion that were signed with more than one hundred companies.

FP7 was particularly effective in strengthening scientific excellence. A total of 171 258

¹² *Ex-Post Evaluation of the Seventh Framework Programme*, SWD(2016) 2, 19.01.2016.

¹³ Commitment and Coherence, High Level Expert Group Report on FP7 ex-post evaluation (2015), p. 60.

¹⁴ Source: CORDA.

publications have been attributed up to date to FP7¹⁵. This gives an average 6.8 publications per funded project, a number that is expected to increase as 38% of all projects are still to be finalised. Further analysis of this figure reveals that 92 826 or 54% are open access (OA) and a further 3 216 are restricted access (i.e. OA but with a more restrictive license). The share of publications in highly-ranked journals lies above the EU average. In some programmes, up to 30% of publications arising from FP7-funded projects rank among the top 5% of highly-cited publications in their disciplines – well above the European and US averages.

FP7 promoted ground-breaking research through the European Research Council (ERC). The numbers of publications in top-rated scientific journals that acknowledge ERC funding, as well as the number of Nobel Prizes and Fields Medals received by ERC grantees, all demonstrate that ERC grants have quickly become a hallmark of scientific excellence.

FP7 was effective in fostering inter-disciplinary research and increased Europe-wide research and innovation collaboration and networking. Collaborative research projects brought together players from different disciplines and the share of researchers participating in projects from different priorities almost doubled over the course of the Programme, leading to durable inter-sectoral collaborations.

FP7 trained and involved leading international scientific and technological talent. FP7 was an open system that allowed more than 21 000 new organisations to receive EU funding. FP7 strengthened the training and long-term mobility of researchers, enhanced the quality of doctoral training and helped improve working conditions for researchers in the EU. FP7 supported 50 000 researchers, including 10 000 PhD candidates from 140 countries (of which more than a third were fellows from third countries).

The programme stimulated the mobility of researchers across Europe. It also contributed to sustainable employment for researchers in Europe and helped increase the participation of women and international researchers in beneficiary research teams. FP7 was also 'open to the world' beyond the 'People' Specific Programme, involving participants from 170 countries overall. In FP7 collaborative projects, 11 organisations from six different countries and nine different regions participated on average.

By promoting excellent and often ground-breaking inter-disciplinary research involving new talent, FP7 was able to address transnational societal challenges and facilitated the establishment of a common scientific base in these areas which address challenges that could not have been fully resolved by single countries alone. FP7 provided the knowledge base to support key EU policies. To date, there are more than 350 cases where FP7 projects have been exploited for policy support.

FP7 contributed effectively to increasing the level of research investment in the EU. It did so notwithstanding the difficult economic situation in the latter part of FP7. FP7 notably compensated for the sharp decline in national public funding for R&I in certain Member States. FP7 also enhanced the alignment of research activities between Member States. It achieved this through common strategic research agendas, aligned national plans and joint calls. Initiatives to coordinate and integrate national programmes mobilised over EUR 2.75 billion in national funding.

Through its aforementioned achievements, FP7 has made explicit, large-scale contributions to the achievement of the priorities of the Europe 2020 strategy, which is the EU's ten-year jobs and growth strategy launched in 2010 to create the conditions for smart, sustainable and inclusive growth. The key objective of Europe 2020 is to move

¹⁵ This figure was extracted using the openAIRE data mining tool.

decisively beyond the crisis and deliver growth that is:

- smart, through more effective investments in education, research and innovation
- sustainable, thanks to a decisive move towards a low-carbon economy
- inclusive, with a strong emphasis on job creation and poverty reduction.

The strategy is focused on five ambitious goals in the areas of employment, innovation, education, poverty reduction and climate/energy. Through its contributions to the EU's GDP, job creation and the competitiveness of European industry, its support for excellent, often inter-disciplinary, breakthrough research, its support for researcher training and capability development, its focus on the resolution of societal challenges, its role in increasing R&I investment in the EU and through the coordination of national programmes, FP7 has contributed to the achievement of the objectives, priorities and headline targets of Europe 2020.

Examples of EU projects in support of R&I

This section provides specific examples of successful R&I projects financed so far, focusing on their societal relevance, the European added value of the support provided, and the concrete results and impacts achieved. As Horizon 2020 projects are still to report their results and impacts, the cases presented below necessarily relate to FP6 and FP7

Fighting malaria and mosquito-borne diseases

Malaria causes 700 000 deaths worldwide every year. It is one of a number of diseases transmitted by mosquitoes. Eradicating mosquitoes is not easy and spraying insecticide on them eventually makes them resistant. Mosquitoes bite at night, entering buildings through ventilation shafts and other openings. The In2Care/MCD project, which was concluded in November 2015, makes use of a simple and inexpensive device to kill these parasites: plastic tubes with nets inside which are coated with insecticide that electrostatically sticks to mosquitoes.

Presently, there are two main methods of malaria mosquitoes control in Africa: indoor spraying on the walls with insecticides, which is done twice a year, or having people sleep under bed nets. Potentially, the system being developed by this project offers a third option which could be used in conjunction with these methods for more efficient control of the disease.

The tubes are installed in ventilation. When a mosquito comes from over a distance, responding to the smell of humans, they will now land on the gauze inside the tube, pick up the insecticide and they will die.

Researchers have tested the device in more than 1 300 houses in Tanzania with good results. They are now working with local construction companies to have the anti-mosquito tubes installed in all new buildings. For a full seven months, the system can kill 100% of the mosquitoes that make contact with the gauze.

The installation cost can be quite high upfront but it becomes very cheap once only the netting is to be replaced. Scientists are now trying different materials and shapes to maximise cost-effectiveness. The tube, installed under the roof, is out of reach of children, so a wide range of insecticides can be used safely. Studies show that enough of the chemical sticks to the insects to ensure that they don't develop resistance.

Cutting the health cost of processed foods

Salt, fat and sugar have a role to play in a healthy diet. But today, many developed countries have alarmingly high levels of obesity, cardiovascular disease and diabetes due

to overconsumption of all three.

The goal of the EU-funded TeRiFiQ project is to reduce the amount of these ingredients in the most frequently consumed food types: dairy, meat, bakery and ready-to-eat. At the same time, the team aims to maintain each food's nutritional quality, taste, safety and affordability.

This unprecedented research involves fine-tuning current product formulations using state-of-the-art technologies such as multiple emulsions – a process that combines oil and water to reduce fat content without compromising on taste or texture. In addition, the quality of the fat in food is improved by partially substituting animal fat with vegetable fat. For sugar, natural sweeteners are being tested as substitutes. Sodium reduction strategies involve the use of microcrystalline salt, which is only visible under a microscope but releases taste in the mouth the same as ordinary salt does, sometimes doing an even better job.

In addition to demonstrating that it is possible to create healthier versions of the food we love, the researchers would like to show to what extent these new formulations could be commercialised. The first step is to test the new foods to establish whether they can be produced on an industrial scale – this is where the project's SME partners come in. Adding new formulations to their existing product portfolio would make these SMEs more competitive, creating jobs and boosting the EU economy.

The results of the project are promising - reductions of up to 30% with no effect on flavour. These healthier options could be on the market in two years, lowering obesity levels and, in turn, healthcare costs once the testing phase is complete.

Elastic road surface to reduce motorway noise pollution

Noise pollution is still an issue on Europe's roads. But thanks to technological advances, it's less down to the sound of the car's engine and more about how tyres touch the road surface. As part of the PERSUADE project, one solution is being tested where part of the road has been covered with experimental surface material that dampens the tyre noise.

Covering roads with recycled tyres isn't a new idea, but previous attempts had serious durability issues and were expensive. The researchers are trying to develop a material that has a high, good noise reduction, has a good durability, a good price, and also a good friction. The material is subject to consistent laboratory improvements where rain water is passed through to ensure the tyres have sufficient tread on the road. In winter, the rubber-containing material yields a better grip than normal asphalt.

This surface is more expensive than a normal pavement but it is a cost-effective alternative to noise barriers. As to durability, researchers made use of a specially designed carousel to simulate years of traffic load on the test surface. It shows how fast the material deteriorates and how much pollution it produces. It is now known that this surface is as durable as normal asphalt and it also is produced less dust than normal asphalt.

The elastic road surface cover developed by this research project removes about 85% of the energy from the traffic noise. A remarkable 8dB reduction has been measured, the equivalent of having a noise barrier of a height of around 3 meters.

Quiet, reliable and environmentally friendly – researchers believe that this material can begin to replace noise barriers across Europe in the near future.

Recharging without cables: the road ahead for electric cars

Electric vehicles are undoubtedly a form of transport with a future, but many technical challenges have to be overcome before they replace petrol and diesel-fuelled cars.

Researchers in EU-supported UNPLUGGED project are working on resolving one of the

biggest problems: how to efficiently recharge batteries. They have developed an innovative wireless charging station for electric vehicles which, unlike other systems, can charge electric cars or vans in around 20 minutes.

The system works with coils energized from the electric grid that are buried under the tarmac of the charging station. When the vehicle is positioned correctly on the charging station, a connection is made between the coils and the car that allows transfer energy to the car.

There were major technical challenges to overcome: how to make operable the communication between the car and the infrastructure, the level of energy transmission and the problem of positioning of the coils which has a big impact on charging efficiency. The researchers are now turning to industry to help complete the testing. As the coils are so innovative, it is still hard to find manufacturers who are interested. Harmonisation is also important such as the frequency used, size of the coils and distance for electric transmission. All this is needed for the system to be fully interoperable.

It's a very flexible, modular system that can charge cars, vans or electric buses which is easier, safer, more vandalism-proof and has less visual impact than charging with cables.

From design to product in a mouse click

Using digital machining, companies can turn a digital design into an object with the click of a mouse. An EU-funded project, CAPP-4-SMEs, has come up with a new and innovative way to do this, bringing the technology within reach of smaller companies with limited budgets.

CAPP-4-SMEs brings together business planning and product design with an innovative method of machining – the process of cutting a raw material into a shape. At the heart of CAPP-4-SMEs is Cloud-based Distributed Process Planning (Cloud-DPP), an online planning system that collects real-time information on the availability of machines, available cutters and tools, as well as guidance on design.

This formula is especially useful for smaller companies since they can go into business with other firms to bring in specialised skills that they do not have in-house. During busy periods the company can find extra support, while in quiet periods it can outsource its own resources, such as machines, robots and monitors. Cloud services can also be used immediately: there is no waiting while equipment is installed.

To maximise the project's impact, the researchers plan to extend its scope to a broader range of manufacturing during the remainder of the project, which ends in November 2015. This includes 3D printing – the creation of three-dimensional objects from a digital file – and the assembly of components in the aerospace and automotive sectors.

Teaming academics and enterprise, CAPP-4-SMEs' platform is expected to sharpen the competitive edge of SMEs, giving them a chance to grow and create more jobs.

A new harvest for Africa

Farmers in Africa have the twin challenges of feeding a growing population and producing crops with limited water access in a changing climate. Water harvesting lets them make the most of surface water from rain and rivers, using low-tech, affordable techniques that can be adapted to changes in weather patterns.

The WAHARA project is centralising data about traditional and new methods of harvesting water for crops. By testing various techniques in different African climates, it is developing a system for farmers and policymakers to choose water-harvesting methods that are suitable for local conditions. Results from the project show that this approach makes crops more reliable and abundant, so farms are more sustainable. Many techniques also preserve topsoil, maintaining levels of soil nutrients that crops need to grow.

WAHARA based its research around four rural study sites, each representing a typical African climate – arid in Tunisia, semi-arid in Burkina Faso, seasonally humid in Ethiopia, and sub-humid in Zambia. Researchers gathered information about water-harvesting techniques from academic publications and local farmers. Typical technologies included stone lines that catch rain as it flows down slopes, ploughing methods that trap rainwater in the soil and small pits that hold rain around crops.

To identify the most appropriate options, the nine-member project has developed a computer-based tool – the Quick Scan Tool – that suggests water-harvesting methods that might suit a region's landscape. However, farmers retain the final say on which techniques they will use as they have the most detailed knowledge of their immediate landscape and of how their farms operate. Based on a database of characteristics such as rainfall and evaporation, ground slope, soil type and landscape, the tool suggests techniques for a specific location in an Excel-based version of the program, or provides maps of characteristics for wider regions in a GIS (Geographical Information Systems) version.

The project has advanced international knowledge of water harvesting. Its data is now included in WOCAT – the World Overview of Conservation Approaches and Technologies – a global database of sustainable land management measures.

Key conclusions on Performance

The ex-post evaluation of FP7 clearly demonstrates the added-value of an EU FP. This can be shown in terms of jobs and growth, but also in terms of technological development and networking between Member States. The number of patent applications and publications, precursors to innovation, is impressive. Horizon 2020 will build on what has already been achieved in FP7, but with a bigger budget and more focus on innovation and bridging the gap to the market.

The projects set out above are just a few of the many ongoing actions that will, in many cases, produce the next set of publications, patents and, in the end, commercial developments.

The other, more policy-related outputs, of DG RTD are also important in developing a healthy research and innovation landscape in Europe. There has been considerable success in implementing the Innovation Union and European Research Area commitments. However, full implementation of the commitments is outside the control of DG RTD, it depends mainly on the Member States to invest sufficiently and effectively in research and innovation, and to set the appropriate framework conditions for innovation to flourish. This has proved more difficult to ensure.

The headline target of 3% of GDP invested in Research and Development by 2020 looks unlikely to be met. The EU has increased considerably its own budget for the research FP but, in difficult economic circumstances, Member States have not achieved their own objectives.

This makes clear the objectives of DG RTD for the next years: continue to implement its own FP effectively, but make more efforts to encourage Member States to invest more and wisely in R&I, and ensure that the right conditions for open science and open innovation exist.

Key conclusions on Management and Internal control

In accordance with the governance statement of the European Commission, DG RTD conducts its operations in compliance with the applicable laws and regulations, working in an open and transparent manner and meeting the expected high level of professional and ethical standards.

The Commission has adopted a set of internal control principles, based on international good practice, aimed to ensure the achievement of policy and operational objectives. The financial regulation requires that the organisational structure and the internal control systems used for the implementation of the budget are set up in accordance with these standards. DG RTD has assessed the internal control systems during the reporting year and has concluded that the internal control principles are implemented and function as intended. Please refer to AAR Part 2 for further details.

In addition, DG RTD has systematically examined the available control results and indicators, including those aimed to supervise entities to which it has entrusted budget implementation tasks, as well as the observations and recommendations issued by internal auditors and the European Court of Auditors (ECA). These elements have been assessed to determine their impact on the management's assurance as regards the achievement of control objectives. Please refer to Part 2 for further details

In conclusion, management has reasonable assurance that, overall, suitable controls are in place and working as intended; risks are being appropriately monitored and mitigated; and necessary improvements and reinforcements are being implemented. The Director General, in his capacity as Authorising Officer by Delegation has signed the Declaration of Assurance albeit qualified by two reservations concerning the errors in the cost claims respectively in FP7 and the Coal and Steel programmes.

Information to the Commissioner

The main elements of this report and assurance declaration, including the reservation(s) envisaged, have been brought to the attention of Commissioner Carlos Moedas, responsible for research, science and innovation.

1. KEY RESULTS AND PROGRESS TOWARDS THE ACHIEVEMENT OF GENERAL AND SPECIFIC OBJECTIVES OF THE DG

1.1 Achievement of General and Specific Objectives

Title XIX of the TFEU deals with Research, Technological Development and Space. It sets out the objective that the EU strengthens its scientific and technological bases by achieving the ERA and encourages it to become more competitive, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties. Two general objectives were specified in DG RTD's 2015 Management Plan (MP) in line with the provisions of this Title and the Europe 2020 strategy (see figure in section '*Policy highlights of the year*' in the *Policy Highlights of the Year* section of the Executive Summary).

1.1.1 Policy area "Research and Technological Development and Space" (Title XIX TFEU): To establish the right framework conditions for research and innovation (General Objective 1)

The first General Objective aims at improving the framework conditions in order to enable the EU to become an innovation-based economy by contributing to recommendations addressed to the EU Member States for improving their R&I systems and policies, by implementing the Innovation Union agenda and by contributing to the completion of the ERA.

Policy area "Research and Technological Development and Space" (Title XIX TFEU)		
General objective 1: To establish the right framework conditions for research and innovation		
☐ Spending Programme ☒ Non-Spending		
Impact indicator:	Innovation Output Indicator	
Baseline (2010)	Latest Result (2015)	Target
100	103.6	___ ¹⁶

During 2015 DG RTD has provided financing, methodological advice and data input (bibliometric data generated via studies) in the preparation of the year's edition of the Innovation Union Scoreboard (IUS)¹⁷. The 2015 report showed that the impact of the economic crisis has become visible for several Member States, while for the EU at large innovation performance has been stalling in the last year. The most innovative EU countries perform best on all dimensions: from R&I inputs, through business innovation activities up to innovation outputs and economic effects, which reflects a balanced national R&I.

¹⁶ See f. 8.

¹⁷ The IUS is annual assessment of innovation in EU Member States, other European countries and key competitors based on 25 indicators relating to enablers, firm activities and innovation outputs.

An analysis of R&I data for individual Member States was used as an input to the assessment of Member States' performance as part of the European Semester. The analysis shows that progress has been made over the past few years on a number of dimensions, where policy efforts and structural reforms are paying off. However, important challenges still need to be addressed in most Member States.

1.1.2 Policy area "Research and Technological Development and Space" (Title XIX TFEU): To increase investment in research and innovation (General Objective 2)

The second General Objective aims to support and facilitate progress by the Member States towards the objective of dedicating 3% of the EU's GDP to R&D. At EU level the objective aims to ensure an efficient and effective implementation of Horizon 2020.

The high-level and long-term nature of this objective, as well as its inclusion of all R&I expenditure (whether public or private, European, national or regional), places the responsibility for its achievement mainly with the Member States. The Commission plays the role of a catalyst and facilitator, encouraging increased investment in R&I by Member States and the business sector through leverage funding and the development of appropriate policies.

Policy area "Research and Technological Development and Space" (Title XIX TFEU)		
General objective 2: To increase investment in research and innovation		
☐ Spending Programme ☒ Non-Spending		
Impact indicator:	Gross expenditure on R&D as % of GDP (R&D Intensity)	
Baseline (2009)	Latest Result (2014)	Target (2020)
1.94%	2.03%	3.00%

While there has been progress on the result for this indicator over the years, as has been previously noted, it will be a challenge to meet the multiannual target¹⁸.

1.1.3 Specific Objective 1: To contribute to the European Semester, in particular through country-specific recommendations (related to General Objective 1 – To establish the right framework conditions for research and innovation)

In collaboration with other Commission services, DG RTD takes part in the annual European Semester exercise whose objective is to support Member States in improving their national research and innovation systems, in particular through country-specific recommendations.

¹⁸ See *Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth* (COM(2014) 130, 5.3.2014).

General Objective 1: To establish the right framework conditions for research and innovation			
Specific Objective 1: To contribute to the European Semester, in particular through country-specific recommendations			
Output indicator:		Number of Member States for which the Commission adopted a R&I country-specific recommendation / Number of Member States for which DG RTD proposed a R&I country-specific recommendation (percentage)	
Baseline (2014)	Latest Result (2015)	Milestone (2016)	Target (2020)
69%	N/A	>80%	>80%

As the Europe 2020 strategy relies to a large extent on structural reforms at Member States level, the European Semester mechanism plays a key role in the governance of economic policy. In 2015, the Commission introduced a new, more streamlined approach to the Semester¹⁹:

- the publication of the Country Reports in February aimed to enable a more genuine dialogue with the Member States on the base of these reports; and
- as a consequence of the new focus and prioritisation of the 2015 country-specific recommendations (CSRs) on the key priority issues of macro-economic and social relevance that require action by Member States in the near term, the number of recommendations has been significantly reduced.

In the context of this new approach, the indicator mentioned for the Semester in the Management Plan 2015 focussed on the number of CSRs addressing R&I issues, has lost its relevance. While the number of CSRs addressing R&I issues has been reduced to four²⁰, in the context of the new approach these CSRs are considered to have more potential impact than the more numerous pre-2015 CSRs.

However, the most important objective for DG RTD was to ensure that all the Country Reports integrate substantial and pertinent analyses of each Member States' R&I systems, with a clear identification of the main R&I challenges and an assessment of the policy responses to the challenges. This objective was achieved. Using the R&I chapters of the Country Reports as a base, this then allowed for an in-depth dialogue with the Member States, notably through a dedicated workshop of the ERA Committee. This approach notably led to the identification of a number of issues to be addressed with the help of the new Horizon 2020 PSF. Several mutual learning exercises have since then been launched on some of the concrete issues identified in this workshop.

¹⁹ *Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank – 2015 European Semester: Country-specific recommendations*, COM(2015) 250, 13.5.2015.

²⁰ Two recommendations, addressed to Germany and the Netherlands, called for increased public R&D investment. The remaining two encouraged reforms to increase the impact of R&D investments and were addressed to Estonia and Latvia.

1.1.4 Specific Objective 2: To implement the Innovation Union commitments (related to General Objective 1 – To establish the right framework conditions for research and innovation)

The Innovation Union Flagship Initiative is the EU's strategy to create an innovation-friendly environment in which researchers and entrepreneurs can enjoy the best conditions to innovate. DG RTD plays a leading role in its overall implementation and leads some of its most important initiatives.

General Objective 1: To establish the right framework conditions for research and innovation			
Specific Objective 2: To implement the Innovation Union commitments			
☐ Spending Programme ☒ Non-Spending			
Result indicator:	Number of Innovation Union commitments on track or achieved (out of 34)		
Baseline (2010)	Latest Result (2015)	Milestone (2016)	Target (2020)
0	34	34	34

This target has been achieved²¹. Apart from supporting other DGs in the delivery of these commitments, DG RTD has been actively delivering on the Innovation Union.

1.1.5 Specific Objective 3: To contribute to the completion of the European Research Area (related to General Objective 1 – To establish the right framework conditions for research and innovation)

As set out in Art. 179 TFEU, the EU has the objective of achieving a European Research Area in which researchers, scientific knowledge and technology circulate freely. DG RTD supports the efforts of Member States and research organisations to implement the policies and the reforms needed to achieve this objective.

Effectiveness of national research systems

The Commission worked closely together with the Council and the Research Working Party in order to prepare the conclusions adopted at the Competitiveness Council in May on the ERA Roadmap²². Member States are now in the process of developing their ERA National Action Plans due by mid-2016.

In June, the conference "Opening up to an ERA of innovation" took place, focussing on the latest developments in ERA policy and Open Science and Open Innovation. Items discussed included the results and outcome of the "Science 2.0: Science in Transition" consultation, the ERA Roadmap, an open labour market for researchers, building up an

²¹ *State of the Innovation Union – Taking stock 2010-2014* (SWD(2014)181).

²² *Council conclusions on the European Research Area Roadmap 2015-2020* (doc. 9351/15 RECH 181 COMPET 286 MI 354 TELECOM 133, 29.05.2015).

innovation ecosystem and future markets.

During the Conference, a new Joint Statement was signed by the members of the ERA Stakeholder's Platform who renewed their firm commitment to ERA and agreed on the principle of an enlargement of the Platform to new members. In a further step, negotiations with five potential members were launched to tackle the challenges identified in the 2014 ERA Progress Report²³. These stakeholders have been asked to prepare their own ERA Action Plans or ERA Strategy in view of the possibility of becoming full members of the Platform in 2016.

Transnational cooperation

Horizon 2020 incentivises transnational cooperation of research teams among the Member States and Associated Countries and leverages national funding for transnational cooperation through Public-Public Partnerships (P2Ps). P2Ps include the 'Article 185 Initiatives', ERA-NET Cofund actions²⁴ and JPIs²⁵.

DG RTD oversees four 'Article 185 Initiatives'. Three of these initiatives – EDCTP 2, EMPIR and Eurostars 2 – were renewed in 2014 for a total EU contribution of up to EUR 1 270 million²⁶.

General Objective 1: To establish the right framework conditions for research and innovation				
Horizon 2020 cross-cutting issue: Funding for Public-Public Partnerships			☒ Spending Programme ☐ Non-Spending	
Result indicator:		Total amount of funds leveraged through Art. 185 initiatives ²⁷		
Initiative	Baseline (2011)	Latest Result (2015)	Milestone (2017)	Target (2020)
EDCTP2	New approach	77.6%	100%	100%

²³ *Communication from the Commission to the Council and the European Parliament: European Research Area – Progress Report 2014* (COM(2014) 575, 15.9.2014).

²⁴ Under Horizon 2020, the ERA-NET instrument requires the implementation of one substantial call with top-up funding from the Commission. The instrument is also 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.

²⁵ JPIs are P2Ps based on Art. 181 TFEU initiated by Member States. They play a key role in jointly addressing major societal challenges and play a key role in jointly addressing major societal challenges. DG RTD is responsible for the following JPIs: Neurodegenerative Disease Research (JPND), Antimicrobial Resistance (JPI AMR), Agriculture, Food Security and Climate Change (FACCE-JPI), Healthy Diet for a Health Life (JPI HDHL), Healthy and Productive Seas and Oceans (JPI Oceans), JPI Climate, Water Challenges for a Changing World (Water JPI), Cultural Heritage and Global Change (JPI on Cultural Heritage) and Urban Europe.

²⁶ The fourth 'Article 185 Initiative' is BONUS which will run until 2017. Its renewal will be considered in the light of the interim evaluation concluded this year.

²⁷ Values are calculated on the basis of the contributions from the Union and the necessary minimum from Participating States to the programme (excluding contributions from third parties to the programme or individual actions). The final value might be higher in case the Participating States make additional contributions to the initiatives.

EMPIR	100%	100%	100%	100%
Eurostars 2	370% ²⁸	300%	300%	300%
Main output in 2015				
Description	Indicator	Target	Result	
Actions launched under the three initiatives	Total public funding (Union and Participating States)	EUR 395 million	EUR 347.54 million	

The Final Evaluation of first Eurostars²⁹ was published in September. An amendment to the Eurostars' Delegation Agreement was signed in December in order to ensure a smooth budgetary implementation for the seven-year period from 2014 to 2020. This amendment will provide more flexibility for the yearly EU contribution to the programme, ensure the EU financial contribution from one year to another and expand the scope of the bank guarantee.

ERA-NET actions support P2Ps (in particular JPIS) in the preparation and implementation of transnational calls and other joint activities. In 2015 a total of 16 ERA-NET Cofund actions have been selected for funding, with a total requested EU contribution of EUR 140 million.

A conference "*Lund Revisited – Next steps in tackling societal challenges*", held in December, took the 2009 "Lund Declaration" as its starting point and focussed on the way forward. The conference came up with a new declaration, the "2015 Lund Declaration", which emphasises the urgency of increased efforts in alignment at national and European levels and the need to better and more rapidly exploit investments in R&I to the benefit of society. At the conference, interim findings of the group of independent experts evaluating the JPI process and the individual JPIS were presented.

Research Infrastructures

Research infrastructures are supported to promote access to them by researchers from Europe and abroad, and to increase the attractiveness of European research at international level. The existence of recognised world-level Research Infrastructures allows Europe to remain at the forefront of top-class scientific and technological development and innovation.

General Objective 1: To establish the right framework conditions for research and innovation	
Horizon 2020 cross-cutting issue: Contribution to the realisation of the European Research Area	☒ Spending Programme ☐ Non-Spending

²⁸ The Participating States of Eurostars have increased their contribution to the initiative over its duration beyond the legally required commitment to ensure funding for a higher number of proposals, thus increasing the leverage effect.

²⁹ *Report from the Commission to the European Parliament and the Council: Final evaluation of the Eurostars Joint Programme (2008-2013)* (COM (2015) 479 final, 30.09.15).

Result indicator: Number of national Research Infrastructures networked ³⁰			
Baseline (FP7-2013)	Latest Result (2015)	Milestone (2018)	Target (2020)
800	285	500	900

In 2015 the Research Infrastructures Work Programme 2016-2017 was finalised. It puts wide emphasis on fostering long-term sustainability of Research Infrastructures (including through the optimisation of assessment and evaluation procedures), on expanding the role and impact of Research Infrastructures in the innovation chain and on maximising the exploitation of data produced or collected by Research Infrastructures.

DG RTD actively participated in the activities of the European Strategy Forum on Research Infrastructures (ESFRI) which supports the development of a European policy for Research Infrastructures. Specifically, DG RTD supported Member States and Associated Countries in coordinating their efforts to identify new pan-European Research Infrastructures or major upgrades to existing ones to be included in the ESFRI Roadmap. Support was also provided to fully implement and ensure sustainability of operations of the infrastructures which had been included in the Roadmap in previous years.

The European Research Infrastructure Consortium (ERIC) is an EU-level legal instrument³¹ to facilitate the joint establishment and operation of Research Infrastructures of European interest. Two new ERICs were established in 2015. These were the Integrated Carbon Observation System (ICOS ERIC)³² and the European Spallation Source (ESS ERIC)³³. This brings to twelve the total number of ERICs established since the adoption of the ERIC Regulation in 2009.

DG RTD, in close consultation with other Services and with the relevant external stakeholders, has drafted a Charter of Access to Research Infrastructures. The Charter promotes a harmonisation of access procedures and an enhanced transparency of access policies adopted by Research Infrastructures throughout the EU. The aim is to enable researchers to access the best Research Infrastructures to perform their work, wherever they might be located.

A stakeholder consultation was launched in December on the long-term sustainability of Research Infrastructures. The objective is to help identify the trends and corresponding actions that should be implemented at regional, national and European levels. The outcome of the consultation will launch a policy debate among policymakers and Research Infrastructures managers on the long-term sustainability of Research Infrastructures.

³⁰ In the sense of being made accessible to all researchers in Europe and beyond through EU support.

³¹ Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community legal framework for a European Research Infrastructure Consortium (ERIC) (OJ L 206, 8.8.2009, p. 1).

³² Commission Implementing Decision (EU) 2015/2097 of 26 October 2015 on setting up the Integrated Carbon Observation System European Research Infrastructure Consortium (ICOS ERIC) (OJ L 303, 20.11.2015, p. 19).

³³ Commission Implementing Decision (EU) 2015/1478 of 19 August 2015 on setting up the European Spallation Source as a European Research Infrastructure Consortium (European Spallation Source ERIC) (OJ L 225, 28.8.2015, p. 16).

Open labour market for researchers

A genuinely open and attractive European labour market for researchers is an essential factor for the completion of the ERA. Open, transparent and merit-based recruitment ensures that research systems are able to select from the widest possible pool of talent, thereby generating excellence and fostering mobility. One such tool is EURAXESS which provides researchers wishing to pursue their research careers in Europe access to information and support services.

General Objective 1: To establish the right framework conditions for research and innovation			
Horizon 2020 cross-cutting issue: Contribution to the realisation of the European Research Area		☒ Spending Programme ☐ Non-Spending	
Output indicator: Annual number of research positions advertised in EURAXESS Jobs			
Baseline (2012) 36 500	Latest Result (2015) 59 820	Milestone (2016) 45 000	Target (2020) 60 000

The milestone for this indicator, set for 2016, has already been exceeded and the 2020 target is within reach.

The "OTM-R package" has been developed to assist Research Public Organisations in carrying out voluntary reviews of their current recruitment policies and practices. The OTM-R, which represents one of the main pillars of the European Charter for Researchers and the Code of conduct for their recruitment, will improve researchers' mobility and career prospects.

In March, a high-level event brought together 250 representatives of organisations which are well-advanced in the implementation of the Human Resources Strategy for researchers (HRS4R). Experts discussed issues such as strengthening the HRS4R, open recruitment and further development of plans to progress in implementing the principles of Charter and Code.

The Commission launched the 'science4refugees' initiative through a dedicated page on EURAXESS Jobs. By matching the profiles of refugees and asylum seekers with a scientific background with research functions in European research institutions and the non-academic sector, the EU will gain an increased diversity of new insight for our research, science and innovation, while taking practical steps in providing meaningful opportunities for a vastly talented, but greatly underprivileged community.

The second EURAXESS Roadshow brought the initiative to students and researchers across Europe. Thirty four cities in 16 countries were visited during the two month tour, building awareness and allowing researchers and students across Europe to try out EURAXESS for themselves.

In the meantime, a call "EURAXESS outreach to Industry" (SEAC.4) was launched to increase the use of EURAXESS by enterprises, while other EURAXESS-related actions aimed at improving its performance for mobile researchers.

Gender equality and mainstreaming in research

European research still suffers from a substantial loss and inefficient use of highly-skilled women, and from a lack of gender dimension in research content. If the number of female PhD graduates has grown significantly in recent years in practically all sectors, women in research remain a minority and the number of women heads of institutions in

the higher education sector is very low.

General Objective 1: To establish the right framework conditions for research and innovation			
Horizon 2020 cross-cutting issue: Contribution to the realisation of the European Research Area		☒ Spending Programme ☐ Non-Spending	
Output indicator:	Percentage of projects (DG RTD) taking into account the gender dimension in R&I content		
Baseline (FP7-2013)	Latest Result	Milestone (2017)	Target (2020)
15%	No result yet	20%	30%

As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestone and, eventually, the multiannual target for this output indicator.

The third edition of the EU Prize for Women Innovators was launched on International Women's Day 2015. The purpose of this prize is to raise awareness of the need for more innovation and more women entrepreneurs. Although women are increasingly active in research, there are still too few who create innovative enterprises. This represents an untapped potential which could address the need for Europe's human resources to remain competitive and find solutions to economic and societal challenges.

Optimal circulation and transfer of scientific knowledge

Publicly funded knowledge must be available for researchers and the private sector, to enhance the knowledge base, diminish regional discrepancies and promote innovative solutions to societal challenges. DG RTD 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.

General Objective 1: To establish the right framework conditions for research and innovation			
Horizon 2020 cross-cutting issue: Contribution to the realisation of the European Research Area		☒ Spending Programme ☐ Non-Spending	
Result indicator:		Share of Open access articles published in peer reviewed journals	
Baseline	Latest Result (2015)	Milestone (2016)	Target (2020)
New approach	No result yet	100%	100%

As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestone and, eventually, the multiannual target for this indicator.

1.1.6 Specific Objective 4: To support and facilitate progress at national level towards the 3% objective of R&D intensity in the EU (related to General Objective 2 – To increase investment in research and innovation)

One of the three Europe 2020 priorities is to develop an economy based on knowledge and innovation (smart growth). The related EU headline target is to dedicate 3% of the EU GDP to research and development (see section 1.1.2). There is a clear need to improve the conditions for private R&D in the EU and many of the measures proposed in the Europe 2020 strategy aim to do this.

To ensure that each Member State tailors the Europe 2020 strategy to its particular situation, the 3% target is translated into national targets and trajectories to reflect each Member State's situation and the level of ambition. The ECA observed that if all Member States achieved their national targets for R&D this would lead to an investment of 2.6% of GDP by 2020 for the whole EU, some way below the headline target of 3%. While agreeing with the calculation, the European Commission in its reply highlighted again the fact that it's Member States who set their national R&D targets at the level they consider the most appropriate and with the Commission having limited scope to influence³⁴.

³⁴ See section 3.17 of the *Annual report of the Court of Auditors on the implementation of the budget concerning the financial year 2014, together with the institutions' replies* (OJ C 373, 10.11.2015, p. 1).

General Objective 2: To increase investment in research and innovation			
Impact indicator: Member States' progress towards their national targets contributing to the 3% objective of R&D intensity in the EU³⁵ ☐ Spending Programme ☒ Non-Spending			
EU/Member State	Baseline (2009)	Latest Result (2014)	Target (2020)
Austria	2.61%	2.99% ^{ep}	3.76%
Belgium	1.98%	2.46% ^{ep}	3.00%
Bulgaria	0.51%	0.80% ^p	1.50%
Croatia	0.84%	0.79%	1.40%
Cyprus	0.45%	0.47% ^p	0.50%
Czech Republic	1.30%	2.00% ^p	1.00%
Denmark	3.07%	3.08% ^{ep}	3.00%
Estonia	1.40%	1.46% ^p	3.00%
Finland	3.75%	3.17%	4.00%
France	2.21%	2.26% ^p	3.00%
Germany	2.72%	2.84% ^{ep}	3.00%
Greece	0.63% ^e	0.83% ^p	1.21%
Hungary	1.14%	1.38%	1.80%
Ireland	1.63%	1.55% ^e	2.00%
Italy	1.22%	1.29% ^p	1.53%
Latvia	0.45%	0.68% ^p	1.50%
Lithuania	0.83%	1.02% ^p	1.90%
Luxembourg	1.71%	1.24% ^{ep}	2.30%
Malta	0.52%	0.85% ^p	2.00%
Netherlands	1.69%	1.97% ^p	2.50%
Poland	0.67%	0.94%	1.70%
Portugal	1.58%	1.29% ^p	3.00%
Romania	0.46%	0.38%	2.00%
Slovakia	0.47%	0.89%	1.00%
Slovenia	1.82%	2.39% ^p	3.00%
Spain	1.35%	1.20% ^p	2.00%
Sweden	3.45%	3.16% ^p	4.00%
United Kingdom	1.75% ^e	1.72% ^{ep}	No target
EU-28	1.94%	2.03%^p	3.00%

It should be noted that impact indicators like this indicator measure long-term changes in the EU R&D landscape. The achievement of the related targets is mainly the responsibility of the Member States, with the Commission playing the role of catalyst and facilitator.

1.1.7 Specific Objective 5: To ensure an effective and efficient implementation of Horizon 2020 (related to General Objective 2 – To increase investment in research and innovation)

With a budget of nearly EUR 78.6 billion (in current prices) for the period 2014-2020, Horizon 2020 represents a major opportunity for boosting innovation and growth in the EU. It focusses on three major areas: excellent science, industrial leadership and societal challenges. Two additional objectives pursued are to spread excellence and widen

³⁵ Source: Eurostat. In this table "e" means estimated and "p" means provisional.

participation and to promote efficient cooperation between science and society. There are also a number of cross-cutting issues. Three additional objectives are related to effective and efficient implementation of the Euratom FP, ITER and the Research Fund for Coal and Steel.

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. In those cases that no significant amount of meaningful data is available for the result indicators of Horizon 2020, main outputs for 2015 are presented. Moreover, as more performance-information from FP7 became available in 2015, in cases where there is continuity between the objectives and indicators of FP7 and Horizon 2020, the corresponding statistics of FP7 are provided.

To support excellence all across Horizon 2020

Art. 15 of the Rules for participation and dissemination in Horizon 2020³⁶ establishes excellence as one of the three award criteria applied to evaluate the proposals submitted for Horizon 2020 funding. The only exception is ERC frontier research actions, where it is the sole criterion. This mechanism will ensure that Horizon 2020 focuses its funding on excellent research across the board.

General Objective 2: To increase investment in research and innovation				
Specific Objective 5: To ensure an effective and efficient implementation of Horizon 2020		☒ Spending Programme ☐ Non-Spending		
Result indicator:		Publications in peer-reviewed high impact journals in the Societal Challenges and in the enabling and industrial technologies (Horizon 2020-DG RTD)		
	Baseline (2013)	Latest result	Milestone (2018)	Target (2020)
Societal Challenges	5 353	No result yet	~2 000	~6 500
Enabling and Industrial Technologies	1 215	No result yet	~360	~1 600
Total	6 568	No result yet	~2 400	~8 100

As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for this indicator.

To focus funding on excellence through the European Research Council (ERC)

Horizon 2020 provides attractive long-term funding to support excellent researchers and their research teams to pursue ground-breaking, high-gain/high-risk research. This

³⁶ Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006 (OJ L 347, 20.12.2013, p. 81).

activity is implemented under the aegis of the ERC, an autonomous science-led funding body governed by an independent Scientific Council.

The ERC assists the best researchers with excellent ideas in different phases of their careers through 'starting grants', 'consolidator grants' and 'advanced grants'. DG RTD supports the ERC in the implementation of these activities through a dedicated implementation structure, the ERC Executive Agency.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Excellent science – ☒ Spending Programme ☐ Non-Spending European Research Council			
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) ³⁷			
Baseline (2010) New approach	Latest Result No result yet	Milestone (2018) 1.5	Target (2020) 1.8
Main outputs in 2015			
Description	Indicator	Target	Result
Grants awarded in 2015 further to selection of proposals	% of proposals selected of ERC 2014 calls awarded in 2015	100%	100%
	% of proposals selected of ERC 'Proof of Concept' (PoC) 2015 call awarded in 2015	35%	35%

The main outputs for 2015 were delivered. Over 7 000 proposals received following four calls launched during the year (under the Starting Grant, Consolidators Grant, Advanced Grant and Proof of Concept schemes) were evaluated.

In this year, the European Commission signed agreements with the national authorities of Argentina, Japan, China and Mexico to allow their most promising young researchers to come to Europe and temporarily join research teams led by ERC grant holders. This is usually done in form of the implementing arrangements of the existing Scientific and Technological Cooperation agreements between the European Commission and the respective national authorities.

Commissioner Moedas and ERC President Jean-Pierre Bourguignon participated in the Davos summit in January to debate the importance of cutting-edge research in an ever

³⁷ 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.

more competitive world, along with eleven ERC-funded top researchers. The ERC also participated in events at the Davos World Economic Forum in September.

To endow Europe with world-class research infrastructures

Horizon 2020 supports a range of activities in the different phases of the development of research infrastructures, an important feature in the continued development of ERA. Support is provided for the integration and opening of existing research infrastructures of trans-European interest.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Excellent science - Research infrastructures ☒ Spending Programme ☐ Non-Spending			
Result indicator: Number of researchers who have access to research infrastructures through Union support			
Baseline (FP7-2013) 22 000	Latest Result No result yet	Milestone (2018) 12 000	Target (2020) 20 000 ³⁸

As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for this indicator.

Enabling and Industrial Technologies

Horizon 2020 contributes to boosting Europe's industrial leadership through research, technological development, demonstration and innovation in the key enabling and industrial technologies (KETs). These include nanotechnologies, advanced materials, biotechnology, advanced manufacturing and processing, micro- and nano-electronics and photonics (NMBP) as well as information and communication technologies (ICTs) and space.

³⁸ Although the overall Horizon 2020 budget for RIs has increased compared to FP7, the result for this indicator is expected to slightly decrease, since priority will be given to new emerging infrastructures and the targeting of new communities (starting communities) whose infrastructures are usually not able to provide as large an access as advanced communities.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Industrial leadership – Leadership in Enabling and industrial technologies (LEIT) ☒ Spending Programme ☐ Non-Spending			
Result indicator: Patent applications in the different enabling and industrial technologies (Horizon 2020-DG RTD ³⁹)			
Baseline (FP7-2013)	Latest Result	Milestone (2018)	Target (2020)
141	No result yet	~50	~220
Main outputs in 2015			
Description	Indicator	Target	Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	5 calls EUR 469.86 million	5 calls EUR 483.04 million

The targets for the main outputs for 2015 have been achieved. In the case of the result indicator, results are not yet available and it is still too early to tell whether the DG is on course to reach the milestone and, eventually, the multiannual target.

By November 2015 the equivalent 'Nanosciences, Nanotechnologies, Materials and new Production Technologies' activity of the 'Cooperation' Specific Programme of FP7 had generated 5 480 publications and 460 patent applications.

On the basis of a broad strategy developed in 2014, the NMBP part of the Horizon 2020 Work Programme 2016-17 was developed and adopted. This took into account a wide range of inputs from the NMBP Advisory Group, the industrial roadmaps focusing on value chains, a wide range of stakeholders (notably ETPs and the partnership boards of cPPPs), extensive inter-service discussions and the lessons learned from the calls of 2014 and 2015.

The evaluations of all eight NMBP calls or sub-calls of 2015 in the 2014-15 Work Programme were completed as planned. Many of these projects focused on pilot lines and demonstrators in industrially relevant or industrial settings. Grants were also signed for three calls made under cPPPs⁴⁰ for a total of 40 projects with a total EU contribution of

³⁹ Includes areas implemented by DG RTD i.e. biotechnology, nanotechnologies, advanced materials and advanced manufacturing and processing and excluding ICT and space and security research which are implemented by other DGs.

⁴⁰ The cPPPs which fall under the responsibility of DG RTD are Factories of the Future (FoF),

EUR 217 million. A series of workshops was held to assess the impact achieved by cPPP projects, the potential uptake and exploitation, the potential benefits of clustering and good practises to maximise impact.

Access to risk finance

In order to enhance access to risk finance for R&I, Horizon 2020 makes use of a Debt Facility (which provides loans to single beneficiaries for investment in R&I) and an Equity Facility (which focuses on early-stage venture capital funds and other potential sources of equity finance). It also contributes to the implementation of the SME Initiative together with the Programme for the Competitiveness of Enterprises and SMEs (COSME), the European Structural and Investment Funds (ESIF) allocated to Member States and the European Investment Bank (EIB) and the European Investment Fund (EIF).

InnovFin Advisory services aim to improve the 'bankability' and investment-readiness of large projects that need substantial, long-term investments. It also provides advice to improve the conditions for access to risk finance for R&I. The main clients are promoters of large R&I projects addressing Horizon 2020's Societal Challenges.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Industrial leadership – Access to risk finance ☒ Spending Programme ☐ Non-Spending			
Result indicator: Total investments mobilised via debt financing and Venture Capital investments			
Baseline (FP7-2013) New approach	Latest Result EUR 17 billion	Milestone (2017) EUR 8 billion	Target (2020) EUR 15 billion
Output indicator: Number of organisations funded			
Baseline (FP7-2013) New approach	Latest Result (2014) 793	Milestone (2017) 2 000	Target (2020) 5 000
Result indicator: Amount of funds leveraged			
Baseline (FP7-2013) New approach	Latest Result EUR 7.2 billion	Milestone (2016) EUR 15 billion	Target (2020) EUR 35 billion
Main outputs in 2015			
Description	Indicator	Target	Result
Continued implementation of the InnovFin debt financial products launched from June 2014 under the Debt Facility and of the InnoVFin SME Venture Capital under the Equity Facility	Total investments mobilised via debt financing and Venture Capital investments (€) – Leverage effect	EUR 3 billion	EUR 5.7 billion
Signatures of first SME Initiative funding agreements with interested Members States	Number of Funding Agreements	2	2
Launch of new financial instruments pilots to support access to finance strengthening Research, Development and Innovation activities	Number of new pilots	2	3

The targets for the main outputs for 2015 have been achieved and, in two cases out of

three, exceeded.

The Delegation Agreement between the EU (represented by the Commission) on the one hand, and the EIB and EIF on the other, was amended on four occasions in 2015 in order to implement new financial instruments (the SME Initiative, InnovFin Energy Demo Projects, InnovFin Infectious Diseases, InnovFin SME VC, InnovFin Angels and EFSI Enhancement) and to provide for detailed implementation rules for the Circular Economy.

The study "Assessing the Potential for EU Investment in Venture Capital and Other Risk Capital Fund of Fund" has provided the rationale for setting up a pan-European Fund of Funds programme and identified the potential benefits.

Innovation in SMEs

'Innovation in SMEs' has two parts. The first refers to the SME instrument which has no budget relevant activities, with topics being financed from the societal challenges and LEIT areas.

The second part is implemented through Eurostars, an 'Article 185 initiative' which aims at the joint implementation of national research programmes undertaken by several Member States and targets research-intensive SMEs in any sector that can demonstrate their capability to commercially exploit project results. The EUREKA Secretariat aisbl (ESE) is in charge of the Programme's implementation.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Industrial leadership – Increasing innovation in SMEs			
☒ Spending Programme ☐ Non-Spending			
Result indicator: Number of SMEs participating in Eurostars projects selected for funding (by the Commission)			
Baseline (FP7-2013) 1 810	Latest Result (2015) 727	Milestone (2017) 2 000	Target (2020) 4 100
Main output in 2015			
Description First signatures of agreements for selected projects from the first cut off dates	Indicator Number of SMEs supported	Target 300-350	Result 280

The target for the main output for 2015 was close to being achieved. While this is still the second year of implementation of the programme, this activity looks to be on course to reach the 2017 milestone for the result indicator.

The Commission Decision for the Financial Contribution of the EU to Eurostars-2 Joint Programme for 2015 and the Eurostars-2 Work Plan 2015 were adopted during the year. The first amendment of the Delegation Agreement between the ESE and the European Commission was signed in order to ensure a smooth budgetary implementation for the seven-year period (2014-2020).

Preparations are underway to set up an Expert Group to assist the Commission in carrying out the Interim Evaluation of Eurostars-2. The results of the ongoing study

"Analysis of the impact of completed Eurostars-1 projects" will feed into this evaluation.

See also section '*Cross-cutting issue – SMEs' participation*'.

Health

DG RTD contributes to improving the lifelong health and wellbeing of all by funding R&I activities in the following areas: understanding health, wellbeing and disease, preventing, treating and managing disease, active ageing and self-management of health, methods and data, healthcare provision and integrated care.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Societal challenges – Health ☒ Spending Programme ☐ Non-Spending			
Result indicator: Publications in peer-reviewed high impact journals in the area of health (DG RTD)			
Baseline (FP7-2013) 3 966	Latest Result No result yet	Milestone (2018) ~1 400	Target (2020) ~4 400
Result indicator: Patent applications in the area of health (DG RTD)			
Baseline (FP7-2013) 186	Latest Result No result yet	Milestone (2018) ~70	Target (2020) ~200
Main outputs in 2015			
Description	Indicator	Target	Latest Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	3 calls EUR 478 million	3 calls EUR 469 million

The targets for the 2015 output indicators were either achieved or the result was close to the target. Results are not yet available for the result indicators and it is therefore too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for these indicators.

By November 2014 the 'Health' activity of the 'Cooperation' Specific Programme of FP7, had generated 16 967 publications and 391 patent applications. These figures do not include projects financed through the Innovative Medicines Initiative (IMI) Joint Undertaking.

IMI2 published four calls for proposals in 2015 which included several topics under a new programme for "Big Data for Better Outcomes", several topics on Alzheimer's disease, as well as a new topic under the "Ebola+" programme to increase readiness to respond to future Ebola disease outbreaks. The first EDCTP2 calls were closed and the first EDCTP2

grant agreements concluded. In September, the Commission adopted the financing decision for the implementation of the 2015 EDCTP2 work plan involving an EU contribution of EUR 71 765 million.

The JPI on Neurodegenerative Diseases further deepened the cooperation around neurodegenerative diseases research, notably through a transnational call for proposals (co-funded by Commission) around risk and protective factors, longitudinal cohort approaches and advanced experimental models. The JPI further promoted the strategic alignment of research via guidelines and recommendations to increase the impact of longitudinal population studies for neurodegenerative disease research, helping researchers to increase collaborative activity and make productive use of longitudinal cohort studies.

In 2015, the Joint Programming Initiative on Anti-Microbial Resistance (JPIAMR) launched its second joint call "Repurposing Neglected Antibiotics and characterising antibiotics or antibiotic and non-antibiotic combinations to overcome bacterial antibiotic resistance" with a cumulated budget of around EUR 10 Million. In December the JPIAMR published a review of public AMR research funding.

In January the Commission approved Singapore joining the Human Frontier Science Programme Organisation (HFSP).

Bioeconomy

DG RTD contributes to accelerating the transition to a sustainable European bioeconomy by bridging the gap between new technologies and their implementation. It supports research and innovation activities in the following areas: sustainable agriculture and forestry, sustainable and competitive agri-food sector for a safe and healthy diet, aquatic living resources, sustainable and competitive bio-based industries and marine and maritime research.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Societal challenges – Bioeconomy			
☒ Spending Programme ☐ Non-Spending			
Result indicator: Publications in peer-reviewed high impact journals in the area of bioeconomy (DG RTD)			
Baseline (FP7-2013) 339	Latest Result No result yet	Milestone (2018) ~120	Target (2020) ~540
Result indicator: Patent applications in the area of bioeconomy (DG RTD)			
Baseline (FP7-2013) 19	Latest Result No result yet	Milestone (2018) ~7	Target (2020) ~30
Main outputs in 2015			
Description	Indicator	Target	Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals	Number of calls and	3 calls	3 calls

budget committed (for Work-programme 2015)	budget committed	EUR 84.5 million	EUR 92.2 million
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The targets for the main outputs for 2015 were achieved. Results are not yet available for the result indicators and it is therefore too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for these indicators.

Under FP7 bioeconomy (together with biotechnology) was part of the 'Food, Agriculture and Fisheries, and Biotechnology' activity of the 'Cooperation' Specific Programme. For this FP7 activity as a whole, by November 2015 projects had generated 4 966 publications and 138 patent applications.

The Commission's Circular Economy Package was launched in December, proposing actions that are relevant to bioeconomy. A chapter on biomass and bio-based products is included as one of five priority areas for the circular economy, alongside plastics, food waste, critical raw materials and construction and demolition. The package furthermore lists a commitment to assess the contribution of the 2012 Bioeconomy Strategy to the circular economy and, if necessary, to update it.

The Bioeconomy Investment Summit took place in Brussels in November. The objective was to identify possible ways to mobilise private and public investment for the bioeconomy, notably by ensuring a supportive policy and regulatory environment. The event was hosted by Commissioners Moedas and Phil Hogan and brought together high-level representatives from, amongst others, the industry, primary producers, civil society, the scientific community, regional public investment banks and private equity firms and representatives of producers in the agricultural, forestry and marine sectors.

Fourteen workshops were organised during Milan Expo 2015. A final conference was held in October, addressed by Commissioner Moedas who announced the setting up of a "Food Research Area" to bring greater coherence across the RTD policy framework.

The Commission's observations and conclusions on the interim evaluation of the Joint Baltic Sea Research and Development Programme BONUS were communicated to the European Parliament and the Council in January 2015⁴¹.

Energy

DG RTD contributes to the transition to a reliable, sustainable and competitive energy system, in the face of increasingly scarce resources, increasing energy needs and climate change. It supports R&I activities in the following areas: reducing energy consumption and carbon footprint through smart and sustainable use, a low-cost, low-carbon electricity supply, alternative fuels and mobile energy sources on a single, smart European electricity grid. It also supports research on new knowledge and technologies, robust decision-making and public engagement and market uptake of energy innovation.

⁴¹ Report from the Commission to the European Parliament and the Council: Interim Evaluation of the Joint Baltic Sea Research and Development Programme BONUS, COM(2015)34 final, 30.01.2015.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 challenges – Energy	Specific Objective:	Societal	☒ Spending Programme ☐ Non-Spending
Output 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)			
Baseline New approach	Latest Result (2015) 94%	Milestone (2016) 85%	Target (2020) 85%
Result indicator: Publications in peer-reviewed high impact journals in the area of energy (DG RTD)			
Baseline (FP7-2013) 119	Latest Result No result yet	Milestone (2018) ~130	Target (2020) ~300
Result indicator: Patent applications in the area of energy (DG RTD)			
Baseline (FP7-2013) 36	Latest Result No result yet	Milestone (2018) ~40	Target (2020) ~90
Main outputs in 2015			
Description	Indicator	Target	Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	3 calls EUR 299 million	3 calls EUR 312 million ⁴²
Communication on "An action plan for the implementation of the Integrated Roadmap on energy technologies and innovation" (DG ENER and DG RTD co-chef)	Delivery of the Communication	First semester of 2015	September 2015

The result for the output indicator is above the 2020 target. For the result indicator, as

⁴² This figure includes the money spent by DG RTD plus the transfers to INEA and EASME (i.e. not actual expenditure by the EAs).

results are not yet available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for the result indicators.

By November 2015 the 'Energy' activity of the 'Cooperation' Specific Programme of FP7 had generated 1 285 publications and 131 patent applications. These figures do not include projects financed through the Fuel Cells and Hydrogen (FCH) Joint Undertaking.

The landmark policy action in the field of energy research was the adoption in September of the Communication on the Integrated Strategic Energy Technology (SET) Plan⁴³. The Communication was one of the first building blocks in the creation of the Energy Union, one of the political priorities of the Juncker Commission. There are ten key actions in the Communication, four of which fall under the responsibility of DG RTD.

During the last quarter of 2015, a process for implementing those actions and measuring their progress was put in place. Two actions were launched. Following the preparation of issue papers by DG RTD and consultations on photovoltaics, offshore wind and concentrated solar power, joint Declarations of Intent by the Commission, national administrations and stakeholder platforms were made in December. These Declarations contain targets agreed by all for each sector.

Four projects from the 2014 call were presented at a conference "Shale gas in a low-carbon Europe – the role of research" which launched a trans-Atlantic dialogue on this topic with the US and Canada. This was followed by a workshop on 'Addressing Environmental Risks associated with Shale Gas and Oil through Worldwide R&D' co-organised by the Commission and the International Energy Agency.

Other noteworthy implementation activities in 2015 included the conclusion and launch of an Administrative Arrangement with the JRC on Energy Policy Support on Unconventional Oil and Gas and on a Low Carbon Energy Observatory and the conclusion and launch of a Framework Contract for the Exploitation of Research Results.

Transport

DG RTD contributes to achieving the transition to a smart, green and integrated transport system, as well as more efficient and competitive transport-related industries. It funds R&I activities in the following areas: resource-efficient transport that respects the environment, better mobility, less congestion, more safety and security, global leadership for the European transport industry, socio-economic and behavioural research and forward-looking activities for policy-making.

⁴³ *Communication from the Commission: Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation*, C(2015) 6317, 15.09.2015.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Societal challenges – Transport ☒ Spending Programme ☐ Non-Spending			
Result indicator:		Publications in peer-reviewed high impact journals in the area of transport (DG RTD)	
Baseline (FP7-2013) 58	Latest Result No result yet	Milestone (2018) ~30	Target (2020) ~90
Result indicator:		Patent applications in the area of transport (DG RTD)	
Baseline (FP7-2013) 31	Latest Result No result yet	Milestone (2018) ~15	Target (2020) ~50
Main outputs in 2015			
Description	Indicator	Target	Latest Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	3 EUR 117.03 million	3 EUR 117.03 million

The targets for the main outputs for 2015 were achieved. As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for the result indicators.

By November 2015 the 'Transport' activity of the 'Cooperation' Specific Programme of FP7 had generated 744 publications and 125 patent applications. These figures do not include projects financed through the Clean Sky Joint Undertaking.

Transport research was funded in the following areas: resource-efficient transport, better mobility, less congestion, more safety and security, global leadership for the European transport industry, socio-economic and behavioural research and forward-looking activities for policymaking. Specific efforts were made to develop research cooperation with selected international partners to address common challenges in the field of aeronautics. These will contribute to bilateral transport cooperation initiatives, such as the EU-China Urbanisation Partnership.

The European Green Vehicles Initiative (EGVI) cPPP was supported as well as the Clean Sky 2 JU (EUR 352.1 million contributed in 2015), the second Fuel Cell & Hydrogen (FCH2) JTI (EUR 27.4 million contributed in 2015) and Shift2Rail JTI (EUR 13 million contributed by DG RTD in 2015 under the responsibility of DG MOVE).

Resource-efficient and climate change-resilient economy

DG RTD contributes to achieving a resource-efficient and climate change-resilient economy by funding R&I activities in the following areas: fighting and adapting to climate change, protecting the environment, sustainably managing natural resources, water, biodiversity and ecosystems, sustainable supply of non-energy and non-agricultural raw materials, green economy and society through eco-innovation, comprehensive and sustained global environmental observation and information systems and cultural heritage.

It also supports the EU's external policies on climate change and contributes to international research initiatives such as the intergovernmental Group on Earth Observations (GEO) and the Intergovernmental Panel on Climate Change (IPCC).

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Societal challenges – Resource-efficient and climate change-resilient economy			
☒ Spending Programme ☐ Non-Spending			
Output indicator: Share of EU financial contribution financing biodiversity			
Baseline (2014) 19%	Latest Result No result yet	Milestone (2018) 20%	Target (2020) 20%
Result indicator: Publications in peer-reviewed high impact journals in the area of resource-efficient and climate change-resilient economy (DG RTD)			
Baseline (FP7-2013) 751	Latest Result No result yet	Milestone (2018) ~240	Target (2020) ~1 000
Result indicator: Patent applications in the area of resource-efficient and climate change-resilient economy (DG RTD)			
Baseline (FP7-2013) 10	Latest Result No result yet	Milestone (2018) ~3	Target (2020) ~15
Main outputs in 2015			
Description	Indicator	Target	Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	3 calls EUR 278 million	3 calls €283.4 million

The targets for the main outputs for 2015 have been achieved. In the case of the result indicators it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets.

By November 2014 the equivalent 'Environment' activity of the 'Cooperation' Specific Programme of FP7 (which included climate change research) had generated 5 467 publications and 37 patent applications.

DG RTD participated actively to the global agreements on the Sustainable Development Goals and the COP21 Climate Summit, both through the support and coordination of R&I projects that provided the evidence needed and through the active involvement of its staff in negotiations. Further to the COP21 Summit, DG RTD contributed in the preparation of the EU's Research, Innovation and Competitiveness Strategy, including post-2030 decarbonisation pathways for the EU, multi-disciplinary and co-designed with the involvement of stakeholders.

DG RTD actively participated in the preparation of the Circular Economy Package⁴⁴. DG RTD mainstreamed the innovation dimension throughout the Communication and saw to the inclusion of actions to be implemented under the Horizon 2020 Focus Area "Industry 2020 in the Circular Economy", the pilot on Innovation Deals and the launch of a platform together with EIB and national banks to support the financing of circular economy.

The main implementation output in 2015 was the publication of Horizon 2020 Work Programme 2016-2017. On climate action, the Work Programme marks a strategic change: traditional sectors that were at the centre of the previous Work Programme, like Waste and Water, are now mainstreamed in more systemic actions (e.g. the cross-cutting area "Industry 2020 in the Circular Economy").

Inclusive, innovative and reflective European societies

DG RTD contributes to fostering inclusive, innovative and reflective European societies in a context of unprecedented transformations and growing global interdependencies. It funds R&I activities in inclusive, innovative and reflective societies, cultural heritage and European identity.

⁴⁴ *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the loop - An EU action plan for the Circular Economy* (COM(2015) 614 final).

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Societal challenges – Inclusive, innovative and reflective European societies ☒ Spending Programme ☐ Non-Spending			
Result indicator:		Publications in peer-reviewed high impact journals in the area of inclusive, innovative and reflective societies (DG RTD)	
Baseline (FP7-2013) 120	Latest Result No result yet	Milestone (2018) ~100	Target (2020) ~200
Main outputs in 2015			
Description	Indicator	Target	Latest Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	5 calls EUR 87.42 million	5 calls EUR 87.42 million

The targets for the main outputs for 2015 were achieved. In the case of the result indicator, it is still too early to tell whether the DG is on course to reach the milestone and, eventually, the multiannual target.

A "Workshop on migration – Research and Innovation" took place in September to take stock of the results of its most recent research funded under FP7. A policy review "Migration – Facing realities and maximising opportunities" on FP7 research projects on migration was carried out by an external expert while a mapping of the activities on migration in DG RTD as well as in Member States was carried out.

In cooperation with DG Employment (DG EMPL), DG RTD participated in the initiative on the Long-Term Unemployed, the preparation for a Communication Labour Mobility Package and New Skills Agenda and on the Employment and Social Developments Review 2015. Moreover, scientific support was provided to the Indicators Group of the Social Protection Committee and the Indicators Group of the Employment Committee. DG RTD participated in other interservice activities including on inequality, on citizenship and on global justice and stability.

The Work Programme 2016-17 includes four calls and 39 topics for this objective with a total budget of EUR 320.36 million. A portfolio of about 120 projects from FP7 provides research results to assist policymaking with scientific evidence for other DGs in fields such as migration, fight against inequalities and long-term unemployment, sustainable development goals, youth and against youth unemployment, innovation and macro-economic balances, neighbourhood policy, fundamental rights and South East Asia and China.

Major events organised or co-organised in 2015 include an international conference on Trust in European Societies and a conference on the aftermath of the financial, economic,

political, governance and social crisis in Europe in order to launch the new 19 Horizon 2020 projects in these areas.

To spread excellence and widen participation

DG RTD contributes to spreading excellence and widening participation and R&I performance of the Member States, addressing the differences in the Research, Development and Innovation (RDI) performances of the Member States.

Horizon 2020 funds the following lines of action: the 'Teaming' of research institutions (creating or upgrading centres of excellence), 'Twinning' (significantly strengthening a defined field of research in an emerging institution through links with internationally-leading institutions), the establishment of 'ERA Chairs' (which attract outstanding researchers to research institutions with a high potential for research excellence) and the European Cooperation in Science and Technology (COST) association.

DG RTD is also responsible for the PSF which is foreseen to improve the design, implementation and evaluation of R&I policies and, specifically, to offer expert advice to public authorities. The PSF would provide leading expertise and guidance to help Member States implement reforms to their research and innovation strategies, programmes and institutional arrangements, following the priority axes for reforms outlined in the Communication on R&I as sources of renewed growth⁴⁵.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective:		☒ Spending Programme	
Spreading excellence and widening participation		☐ Non-Spending	
Result indicator:		Evolution of the publications in high impact journals in the given research field ⁴⁶	
Baseline	Latest Result	Milestone (2018)	Target (2020)
New approach	No result yet	To be defined	To be defined
Main outputs in 2015			
Description	Indicator	Target	Latest Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	1 call EUR 65.27 million	1 call EUR 65.27 million

⁴⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Research and innovation as sources of renewed growth, COM(2014) 339, 10.6.2014.

⁴⁶ This indicator is only relevant to institutions participating in Twinning and ERA-Chairs schemes.

The targets for the main outputs for 2015 were achieved. In the case of the result indicator, the milestone and multiannual target are still to be defined on the basis of the Horizon 2020 interim evaluation in 2017.

By November 2015 the equivalent 'Regions of Knowledge' of the 'Capacities' Specific Programme of FP7 projects had generated 16 publications.

In October a new action, the "Seal of Excellence" (SoE), was officially launched by Commissioner Moedas. The SoE is a quality label, awarded to project proposals which succeeded in passing all of the stringent selection and award criteria but could not be funded under the available Call budget.

The COST Framework as an intergovernmental scientific networking instrument is funded up to 50% from the widening pillar. The implementation of this activity is delegated to an external body i.e. the COST Association aisbl on the grounds of a Specific Grant Agreement (SGA) under a Framework Partnership Agreement (FPA) with the Commission. The COST Association is in charge of running two open calls per year, selecting the networking actions and monitoring their implementation by third parties.

In 2015, the JPI Urban Europe achieved an important milestone - a completion of the Strategic Research and Innovation Agenda (SRIA) that guides activities of the initiative until 2020. The JPI published its SRIA by organising – in collaboration with DG RTD, the Science and Technology Options Assessment (STOA) and the URBAN Intergroup of the European Parliament – a high level SRIA launch seminar entitled 'Transition towards Sustainable and Liveable Urban Futures' in September.

Science with and for society

DG RTD contributes to building efficient cooperation between science and society and to pairing scientific excellence with social awareness and responsibility. It encourages citizens to engage in science and promotes science-based activities, works towards increasing the relevance and social acceptability of science and innovation issues and advances responsible R&I.

It also works on making scientific and technological careers attractive to young students, improves interactions between scientists, the general media and the public and develops the ex-ante assessment of potential environmental, health and safety impacts of R&I activities.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Specific Objective: Science with and for society		☒ Spending Programme ☐ Non-Spending	
Result indicator:		Number of institutional change actions promoted by the programme	
Baseline New approach	Latest Result 2 ⁴⁷	Milestone To be defined	Target (2020) To be defined
Main outputs in 2015			
Description	Indicator	Target	Latest Result
Development of high-quality work-programme	Coverage of published topics (Work-programme 2015)	100%	100%
Launch of calls for proposals and budget committed (for Work-programme 2015)	Number of calls and budget committed	4 calls EUR 45.4 million	4 calls EUR 53.08 million

The targets for the main outputs for 2015 were achieved. In the case of the result indicator, milestone and multiannual target are still to be defined on the basis of the Horizon 2020 interim evaluation in 2017.

By November 2015 the 'Science in Society' activity of the 'Capacities' Specific Programme of FP7 had generated 256 publications.

The December Council Conclusions on advancing Gender Equality in the European Research Area calls on Member States to address gender imbalances in research institutions. Member States were invited to consider setting targets for full professors as well as for decision-making bodies including scientific and administrative boards, recruitment and promotion committees as well as evaluation panels. The Conclusions also highlighted the importance of a better integration of the gender dimension in research content and the need to make institutional change a key element of national policy frameworks on gender equality.

The same Conclusions also recognise the importance of Research Integrity. To this end, the ethical dimension in Horizon 2020 has been enlarged to include Research Integrity among the essential ethical principles. With a view to implementing the recommendations of the Council, the Commission will further clarify the Research integrity obligations by reinforcing cooperation with the national integrity bodies and other actors (in particular the industry), developing adequate training schemes and material, financing top level research projects on Research Ethics and Integrity and

⁴⁷ These were two topics: GERI.4 for Gender (3 projects funded with 24 partners) and ISSI.5 for RRI (3 projects with 30 partners).

establishing a Research Integrity office for Horizon 2020.

Cross-cutting issue – SMEs' participation

Apart from the activities financed under the Horizon 2020 Specific Objective Innovation in SMEs, SME participation in Horizon 2020 is supported and promoted as a cross-cutting issue. Specific approaches include the Equity Facility and the SME window of the Debt Facility, PPPs with an adequate representation of SMEs and the Fast Track to Innovation pilot scheme which aims to reduce the time from idea-to-market and to increase the participation in Horizon 2020 of industry, SMEs and first-time industry applicants.

General Objective 2: To increase investment in research and innovation				
Horizon 2020 cross-cutting issue: 'SMEs' participation' ☒ Spending Programme ☐ Non-Spending				
Output indicator: Share of Horizon 2020 ⁴⁸ allocated to SMEs; of which share of funds allocated through the SME instrument				
	Baseline	Latest Result (2015)	Milestone (2016)	Target (2020)
SME instrument	New approach	5.3%	5.0%	7.0%
SMEs total	17.2% (June 2013 FP7)	23.4%	20.0%	20.0%

The sub-results for the output indicator are already beyond the milestone foreseen for 2016 and, if the same level of performance is maintained, the 2020 target should be achieved.

⁴⁸ See f. 9.

Cross-cutting issue – To support innovation and attract private participation

General Objective 2: To increase investment in research and innovation				
Horizon 2020 cross-cutting issues: "Bridging from discovery to market application" and "Private sector participation" ☒ Spending Programme ☐ Non-Spending				
Output indicator: Share of Horizon 2020-DG RTD funds going to private for profit entities ⁴⁹				
Baseline (FP7-2013)	Latest Result (2015)	Milestone (2016)	Target (2020)	
29.2%	27.4% ⁵⁰	33.0%	33.0%	
Result indicator: Number of joint public-private publications in Enabling and Industrial Technologies and in the Societal Challenges (Horizon 2020 - DG RTD) ⁵¹				
	Baseline	Latest Result	Milestone (2016)	Target (2020)
Enabling and Industrial technologies	New approach	No result yet	To be defined	To be defined
Societal Challenges	New approach	No result yet	To be defined	To be defined
Total	New approach	No result yet	To be defined	To be defined
Result indicator: Patent applications in the Societal Challenges and in the enabling and industrial technologies (Horizon 2020-DG RTD) ⁴⁹				
	Baseline (2013)	Latest Result	Milestone (2018)	Target (2020)
Enabling and Industrial technologies	141	No result yet	~50	~220
Societal Challenges	282	No result yet	~130	~390
Total	423	No result yet	~180	~610

⁴⁹ Baseline, milestone and target figures were corrected in MP 2015 which are the figures reported here.

⁵⁰ Total combined budgets for all Horizon 2020-DG RTD specific objectives in Industrial Leadership (excluding 'Access to Risk Finance') and Societal Challenges.

⁵¹ Milestones and targets for this indicator will be defined on the basis of first results.

Result indicator: Number of prototypes and testing activities in the Societal Challenges and in the enabling and industrial technologies (Horizon 2020-DG RTD)				
	Baseline	Latest Result	Milestone (2016)	Target (2020)
Enabling and Industrial technologies	New approach	No result yet	To be defined	To be defined
Societal Challenges	New approach	No result yet	To be defined	To be defined
Total	New approach	No result yet	To be defined	To be defined

The result for the "Share of Horizon 2020-DG RTD funds going to private for profit entities" output indicator is close to the 2016 milestone. As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for the result indicators.

Cross-cutting issue – Public-Private Partnerships (PPPs)

DG RTD is responsible for four Joint Undertakings which leverage private investment for R&I to address major bottlenecks in their respective Horizon 2020 Societal Challenges for a total EU contribution of up to EUR 5 033 million. These are:

- the Bio-Based Industries Joint Undertaking (BBI) which contributed to the "Food" and Enabling and industrial technologies "Biotechnology" (total EU contribution up to EUR 975 million)
- IMI2 which contributed to the 'Health' societal challenge (total EU contribution up to EUR 1 638 million)
- FCH2 which contributed to the 'Energy' and 'Transport' societal challenges (total EU contribution up to EUR 665 million)
- the Clean Sky 2 Joint Undertaking which contributed to the 'Transport' societal challenge (total EU contribution up to EUR 1 755 million)

In addition, DG RTD is responsible for four contractual PPPs financed by Horizon 2020 (i.e. partnerships based on a contractual arrangement between the Commission and the private sector): Factories of the Future, Energy-efficient Buildings, European Green Vehicles and Sustainable Process Industry initiatives (SPIRE).

DG RTD also contributes to the Shift2Rail Joint Undertaking⁵² which is the responsibility of DG for Mobility and Transport (DG MOVE).

⁵² Total EU contribution up to € 450 million.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 cross-cutting issue: "Funding for Public-Private Partnerships" ☒ Spending Programme ☐ Non-Spending			
Result indicator: PPPs leverage: total amount of funds leveraged through Article 187 initiatives managed by DG RTD divided by the EU contribution			
Baseline 1.00 (EUR 2.27 billion for EUR 2.27 billion of EU contribution from FP7)	Latest Result No result yet	Milestone (2016) 0.84	Target (2020) 1.39 (EUR 7 013 billion for EUR 5 033 billion of EU contribution from Horizon 2020)

As results are not yet available, it is still too early to tell whether the DG is on course to reach the milestone and, eventually, the multiannual target for this indicator.

Cross-cutting issue – To engage with international partners on the basis of mutual interest

The EU engages with international partners in R&I cooperation on the basis of mutual interest. This supports the EU's excellence, attractiveness and competitiveness, tackles global societal challenges and supports the EU's external policies.

This engagement takes place through Horizon 2020 Association Agreements, bilateral S&T Agreements, Association Agreements signed with non-EU countries and policy dialogues with other countries and regions.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 cross-cutting issue: "International Cooperation" ☒ Spending Programme ☐ Non-Spending			
Output indicator: Share of third-country participants in Horizon 2020-DG RTD			
Baseline (2013) 5.7%	Latest Result (2015) 2.3%	Milestone (2018) 7.0%	Target (2020) 10.0%

The result for 2015 was lower than the baseline (last year of FP7) and the result for 2014. The demise of some dedicated international cooperation instruments such as SICA (Specific International Cooperation Actions), the change of the funding conditions of BRIC-M countries in Horizon 2020 with respect to FP7, as well the socio-economic turmoil in Southern Neighbourhood countries, explain most of the difference between the baseline and the share of third-country participants in 2015.

Corrective actions have been taken, including increasing the number of topics flagged in Horizon 2020 Work Programme 2016-17 as particularly relevant for international cooperation (+25%), setting up co-funding mechanisms for nearly ten countries and territories and intensifying communication. However, many of these actions have been put in place throughout the second half of 2015 and therefore their impact in making the "Open to the World" priority a reality is still to be evaluated

Agreements for the association of the Ukraine and Tunisia to Horizon 2020 were signed and the renewal of the Science and Technology (S&T) Agreement with Mexico was completed during the year. Preparations were made for an association agreement with Georgia and Armenia and an S&T agreement with India.

In addition, the European Commission signed Implementing Arrangements with Argentina, South Africa, China, Japan and Mexico to provide opportunities to research fellows from these countries to pursue research collaboration with European colleagues already supported through European Research Council (ERC) grants. Co-funding mechanisms were agreed with several countries and territories to facilitate their participation in Horizon 2020.

The Commission has continued focusing on science diplomacy and enhancing synergies with external policies, coordinating Horizon 2020 actions with those carried out through other instruments, as well as with the EU Member States particularly via the Strategic Forum for International Science and Technology Cooperation (SFIC). Relations with international organisations, such as UNESCO, have been strengthened and initiatives to contribute to the overall objectives set by the European Agenda on Migration⁵³ were initiated.

Communication activities were strengthened in 2015 through the "Horizon 2020 – Open to the World" campaign, while continuing to focus on the promotion of the Excellence of the EU's R&I landscape and ensuring that Horizon 2020 is known worldwide. Four Destination Europe events were organized to raise awareness of the opportunities available to researchers interested in working in Europe: three were held in the USA and the first such event in Latin America was held in Brazil.

Science diplomacy was also a key element of the communication activities, stressed in several high level events like in the conference "Building a knowledge-oriented and forward looking EU Neighbourhood" co-organised with the European Parliament and "Addressing shared challenges through Science Diplomacy: the case of EU-Middle East regional cooperation" that took place in Jordan. In addition, R&I was an important contributor to the corporate campaign of the "European Year of Development" managed by DG DEVCO presenting 62 of its successful projects and organising 10 events (including one in EXPO Milan, under the theme "EU-Africa Partnership in Food and nutrition security").

Cross-cutting issue – Sustainable development and climate change

Climate change and sustainable development are being promoted all across Horizon 2020 as cross-cutting issues and information on expenditure related to these issues will be monitored along the programme. Biodiversity-related expenditure is monitored in the programmable parts of Horizon 2020.

⁵³ *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European Agenda on Migration*, COM(2015) 240, 13.05.2015.

General Objective 2: To increase investment in research and innovation				
Specific Objective 5: To ensure an effective and efficient implementation of Horizon 2020 (Horizon 2020 cross-cutting issue: 'Sustainable development and climate change, including information on climate change related expenditure')			☒ Spending Programme	
			☐ Non-Spending	
Output indicator: Climate-related expenditure				
	Baseline	Latest Result (2014) ⁵⁴	Milestone (2017)	Target (2020)
Horizon 2020	New approach	34.0%	>35.0%	>35.0%
Horizon 2020-DG RTD		23.6%		
Output indicator: Sustainable development-related expenditure				
	Baseline	Latest Result (2014) ⁵⁵	Milestone (2017)	Target (2020)
Horizon 2020	New approach	51.0%	60.0%	60.0%
Horizon 2020-DG RTD		44.8%		

While considerable improvement needs to be made in the results for these output indicators, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets.

Cross-cutting issue – Social sciences and humanities

Research in social sciences and humanities is being promoted across Horizon 2020 and, in particular, the Specific Objective Leadership in Enabling and Industrial Technologies and in the Societal Challenges.

⁵⁴ Bottom-up calls not included.

⁵⁵ Bottom-up calls not included.

General Objective 2: To increase investment in research and innovation				
Horizon 2020 cross-cutting issue: "Social sciences and humanities" ☒ Spending Programme ☐ Non-Spending				
Output indicator: Share of SSH partners in selected projects in all Horizon 2020 priorities and share of EU financial contribution allocated to them				
	Baseline	Latest Result (2015)	Milestone (2017)	Target (2020)
Share of SSH partners	New approach	2.54%	3%	6%
Share of EU financial contribution allocated to them	New approach	2.53%	1.25%	2.5%

While it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for the two output indicators, the latest results are encouraging and, on one case, the target has already been exceeded.

The implementation of the Action Plan for the Integration of Social Sciences and the Humanities in Horizon 2020 (which had been adopted in 2014) continued in 2015. The plan seeks to improve the quality of the topics with SSH integration in the Work Programmes 2016-17, make sure that the procedures of evaluation of SSH integrated topics duly include sufficient SSH expertise and advertise the policy of SSH integration within the Commission services and outside towards research stakeholders and the National Contact Points through several specific workshops.

The first monitoring report on SSH integration in Horizon 2020 "Integration of Social sciences and Humanities in Horizon 2020: participants, budgets and disciplines", based on all results of 2014, was published in 2015. This report was very well received within the Commission and outside and is seen as a model of evaluation of cross-cutting issues under Horizon 2020.

Euratom Research and Training Programme – Fission

DG RTD uses a range of instruments, such as grants and programme co-fund actions, to pursue nuclear research and training activities with an emphasis on continuous improvement of nuclear safety, security and radiation protection, notably to potentially contribute to the long-term decarbonisation of the energy system in a safe, efficient and secure way.

This objective shall be implemented through R&I activities on the safe operation of nuclear systems, development of solutions for the management of ultimate nuclear waste, development and sustainability of nuclear competences at EU level and radiation protection.

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Euratom four Specific Objectives: ☒ Spending Programme ☐ Non-Spending			
Result indicator: Number of projects (joint research and/or coordinated actions) likely to lead to a demonstrable improvement in nuclear safety practices in Europe			
Baseline (2007-13) 41	Latest Result (2015) 8	Milestone (2015) 7	Target (2018) 14
Result indicator: Number of projects contributing to the development of safe long-term solutions for the management of ultimate nuclear waste			
Baseline (2007-13) 15	Latest Result (2015) 5	Milestone (2016) 5	Target (2018) 8
Result indicator: Training through research – number of PhD students and Post-Doc researchers supported through the Euratom fission projects			
Baseline (2007-13) 200	Latest Result No result yet	Milestone (2015) 500	Target (2018) 1 000
Output indicator: Number of projects likely to have a demonstrable impact on regulatory practice regarding radiation protection and on development of medical applications of radiation			
Baseline (2007-13) 33	Latest Result (2015) 1	Milestone (2016) 6	Target (2018) 25
Result indicator: Patent applications on the basis of research activities supported by the Euratom Programme (average per year)			
Baseline (2007-13) 2-3	Latest Result No result yet	Milestone (2015) 2-3	Target (2018) 4

In the case of indicators for which results are available, it would seem that DG RTD is on the way to achieve the milestones for the coming years. Where results are not available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for these indicators.

By November 2015 the 'Fusion Energy' activity of the 'Euratom' Specific Programme had generated 649 publications and 14 patent applications.

The Commission Communications on Energy Union and on Integrated Strategic Energy

⁵⁶ Where targets are lower than baselines this is due to the larger average size of the projects expected in the Euratom FP (2014-2018).

Technology (SET) Plan recognise the need for Europe to maintain a technological leadership in the nuclear field in order to ensure nuclear safety and to limit energy dependence. On the basis of the Euratom Work Programme 2016-17 a call for proposals was published in October with a budget dedicated to the Energy Union priorities.

The Work Programme provides support under fourteen different call topics grouped under themes that address important challenges in main areas of nuclear research: safety, radiation protection, waste management, education and training. Compared to previous Work Programme, more emphasis is placed on the long-term security of energy supply at EU level.

The first rounds of negotiations and Info-Day sessions were held with the Ukraine on the country's association to the Euratom Research and Training Programme. Bilateral meetings took also place with China in order to strengthen the strategic bilateral cooperation in fission research. An analysis and first steps were taken on co-operation with Turkey.

Euratom Research and Training Programme – Fusion

The Euratom Programme supports research in magnetic confinement fusion and related knowledge management and technology transfer from research to industry. Fusion research funded by the Euratom Programme is guided by the comprehensive goal-oriented roadmap⁵⁷ agreed by the national fusion labs towards the end of 2012.

Although fusion research activities, currently being carried out, will be largely focused on ensuring the success of ITER, the Euratom contribution to ITER construction is no longer funded through the Euratom research programme itself. In the long term, the Euratom Programme seeks to support the development of a competitive nuclear fusion industrial sector. It involves the private sector (and, where appropriate, SMEs) in particular through the implementation of the above-mentioned roadmap to a fusion power plant with active industrial involvement in the design and development projects.

DG RTD uses a range of instruments, and in particular a programme co-fund action, to fund research and innovation activities undertaken by members of the consortium of European fusion laboratories, with the objectives to ensure the swift start of the high-performance operation of ITER, including the use of relevant facilities (e.g. JET, the Joint European Torus) and to lay the foundations for future fusion power plants by developing materials, technologies and conceptual design.

⁵⁷ *Fusion electricity: A roadmap to the realisation of fusion energy.* <http://www.euro-fusion.org/wpcms/wp-content/uploads/2013/01/JG12.356-web.pdf>

General Objective 2: To increase investment in research and innovation			
Horizon 2020 Euratom Specific Objective: Fusion		☒ Spending Programme ☐ Non-Spending	
Result indicator	Number of publications in peer-reviewed high impact journals		
Baseline (2010) 800	Latest Result (2014) 200	Milestone (2016) 800	Target (2018) 800
Result indicator	Percentage of the Fusion Roadmap's milestones (2014-2018) reached by the Euratom Programme		
Baseline New approach	Latest Result (2014) 10%	Milestone (2016) 25%	Target (2018) 90%
Result indicator	Number of spin-offs from the Fusion research under Euratom Programme		
Baseline (2007-13) 4	Latest Result (2014) 1	Milestone (2016) 5	Target (2018) 10
Result indicator	Patent applications on the basis of research activities supported by the Euratom Programme (average per year)		
Baseline (2007-13) 2-3	Latest Result (2014) 1	Milestone (2015) 2-3	Target (2018) 4
Result indicator	Number of researchers who have access to research infrastructures through Euratom support		
Baseline (2008) ~800	Latest Result (2014) 872	Milestone (2015) 800	Target (2018) 1 200
Output indicator	Number of fellows and trainees in the Euratom Fusion Programme (average per year)		
Baseline (2007-13) 27	Latest Result (2014) 17	Milestone (2015) 50	Target (2018) 50

As only the results of the first year of implementation are available, it is still too early to tell whether the DG is on course to reach the milestones and, eventually, the multiannual targets for these indicators.

By November 2015 the 'Fusion Energy' activity of the 'Euratom' Specific Programme, projects had generated 136 publications.

This was the second year of the 5-year EUROfusion joint programme, co-funded by the Euratom programme under the terms of a Horizon 2020 Grant Agreement⁵⁸. All national

⁵⁸ EUROfusion is to receive EUR 424 million in Euratom funding over 5 years provided through a

fusion labs and institutes are partners in the EUROfusion consortium and the joint programme is in line with the missions of the fusion roadmap as agreed by national labs in 2012. The reporting of activities carried out in 2014 was successfully assessed by the Commission which showed that 80% of the first year's scientific objectives had been achieved. In addition, EUROfusion's Annual Work Plan 2016 was evaluated and approved. This was also the second year in the 5-year New Jet Operating Contract (NJOC)⁵⁹. Amendments of both the EUROfusion Grant Agreement and the NJOC were approved during the year, and all interim payments were made as foreseen.

In international cooperation, 2015 marked the furthering of the collaboration with China in the area of fusion with the agreement on a range of common joint actions to be implemented under the EUROfusion joint programme. Furthermore, the negotiations with Ukraine over association to the Euratom programme reached its final stages, with formal signature of the agreement expected early in 2016. Ukraine has considerable expertise and competences in the area of fusion energy research.

ITER

Responsibility for ITER was transferred to DG ENER during the year.

Research Fund on Coal and Steel (RFCS)

The Research Fund on Coal and Steel (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 carbon dioxide emissions from coal use and steel production.

The RFCS runs open calls with a "bottom-up" approach, in line with the Council Decision which established the programme⁶⁰. There is a good balance between industry, research institutions and universities. The indicator developed for this programme (share of the RFCS funds going to private for profit entities) has reached its target.

General Objective 2: To increase investment in research and innovation			
Specific Objective 5: RFCS Specific Objective: To enhance the safety, efficiency and competitive edge of the EU coal and steel industries			☒ Spending Programme ☐ Non-Spending
Output indicator Share of the RFCS funds going to private for profit entities			
Baseline (2013)	Latest Result (2015)	Milestone (2016)	Target (2020)
38.90%	38.22%	40.00%	40.00%

As this is only the second year of implementation, it is too early to tell whether the DG is

Grant Agreement for European Joint Programme co-fund action. The total joint programme funding will be at least EUR 850 million over 2014-18 (the balance provided by the national labs and Member States). Euratom payments in 2015 totalled around EUR 62 million.

⁵⁹ NJOC is to receive EUR 283 million in Euratom funding over 5 years for the operation of JET (equivalent to 87.5% of the total operating costs, with 12.5% from the UK operator, CCFE – the Culham Centre for Fusion Energy). Euratom payments in 2015 totalled around EUR 60 million.

⁶⁰ 2008/376/EC: Council Decision of 29 April 2008 on the adoption of the Research Programme of the Research Fund for Coal and Steel and on the multiannual technical guidelines for this programme (OJ L 130, 20.5.2008, p. 7).

on course to reach the milestone and, eventually, the multiannual target for this result indicator. The RFCS runs open calls with a "bottom-up" approach, in line with the Council Decision which set up the programme. It is therefore more difficult to predict participation for private entities. However, in 2015 a good balance between industry, research institutions and universities had been established.

The proposal for adoption of the Research Programme of the RFCS and its multiannual technical guidelines⁶¹, initially planned to be completed in 2014, had to be postponed. The Inter-Service Consultation was eventually closed in December 2015.

Main activities in 2015 included the successful adoption of a new Model Grant Agreement for RFCS, the signature of all Grant Agreements for the successful proposals including one proposal which went through re-evaluation process and the evaluation of all proposals submitted to the 2015 call.

1.1.8 Horizontal Activities

Horizon 2020 work programmes for 2016-17

In order to maximise the impact of EU funding and secure the highest added value, a strategic programming process ensures that the implementation of Horizon 2020 responds to new scientific, technical and economic developments, covers the full R&I cycle and contributes significantly towards the EU's overall policy objectives.

The process ensures that the programme implementation is integrated and coherent, with increased emphasis on R&I priorities that are of a cross disciplinary-nature, leading to the Horizon 2020 work programmes for 2016-17.

Horizontal Objective 2: To ensure the adoption by the Commission of the Horizon 2020 work programmes for 2016-2017		
Indicator Number of Horizon 2020 work programmes for 2016-2017		
Baseline (31/12/2014)	Target (Q3 2015)	Result
N/A	3/3	Achieved

Communication

The present political support for investment in R&I is significant but the momentum needs to be sustained through a stronger communication push. The communication challenge ahead is twofold: to mobilise recipients of EU funding and help them communicate the results of their work in a broader societal context and to develop a context-dependent narrative, targeting both citizens and decision makers. To address this whilst ensuring a coherent approach, a Horizon 2020 communication plan (2014-2020) has been prepared together with the Research family.

Collaboration with the EU Representations will be sought to maximise the local reach to the general public. All major communication channels are covered: TV, radio, written press and the internet. A social media strategy to multiply impact and dissemination potential will underpin all communication actions. In addition, the launch of calls foreseen

⁶¹ Through amendment of 2008/376/EC: Council Decision of 29 April 2008 on the adoption of the Research Programme of the Research Fund for Coal and Steel and on the multiannual technical guidelines for this programme (OJ L 130, 20.5.2008, p. 7).

under the 2016-2017 Work Programme will be accompanied by specific communication actions in the Member States.

Horizontal Objective 3: To ensure a high level of awareness of Horizon 2020 and of the impact of EU-funded Research and Innovation		
Indicator Media uptake (number of media clippings) related to Horizon 2020 campaign (September 2014-December 2015)		
Baseline (01/09/2014)	Target (31/10/2015)	Result
4 000	$\geq 2\,400^{62}$	8 755 ⁶³

Evaluation and reporting

R&I activities are critical factors that will help increase competitiveness and employment of the Union by creating sources of renewed growth, particularly when combined with macro-economic stability and with supportive and inter-linked policies. And vice versa, framework conditions and other policies impact upon research and innovation activities in both quantitative and qualitative terms. Evaluation is an important instrument for informing the European Parliament and the Council, the research community, the general public and other stakeholders about the achievements of Community-funding research and innovation programmes and the obstacles that impact upon the R&I programmes' achievements.

In order to help track results of European research and innovation policy and analyse its broader economic, social and environmental impacts, DG RTD is committed to contribute to the better regulation agenda by carrying out and supporting thorough evaluations and impact assessments and systematic stakeholder consultations in R&I.

Horizontal Objective 4: To support the better regulation agenda and the evidence-based policy-making by thorough evaluations and impact assessments and systematic stakeholder consultations		
Indicator Degree of implementation of DG RTD's evaluation plan		
Baseline	Target (2015)	Result
88% of RTD's 2014 evaluation plan is completed (to date)	90%	94.4%
Indicator Percentage of impact assessment presented by DG RTD that received a favourable Impact Assessment Board (IAB) opinion in first instance (no resubmission)		

⁶² The 2014 baseline is higher than the 2015 target as this was the year when Horizon 2020 was launched with a dedicated media campaign. While the communication effort was expected to be very high during 2015, it was not expected to have an impact on the media comparable to that in 2014.

⁶³ Print only. There was a spike in the number of clippings due to the EXPO media campaign for RTD (six months' duration) resulting in over 16 million potential reach on Twitter alone with resulting spill over to print media. In addition, the Horizon 2020 Work Programme 2016-17 calls' launch also had an impact on the increased number of clippings.

Baseline	Target (2015)	Result
Below Commission average	At least equal to the Commission average	No impact assessments submitted

Human Resources

The overall objective with regards to human resources is to ensure the optimal allocation of staff to allow the DG to achieve its mission and objectives, including human resources management and forward planning based on workload indicators. The activities related to this objective encompass recruitment, mobility, career development, staff performance evaluation, training, professional ethics, equal opportunities, as well as the social aspects of the personnel policy.

The particular challenge for 2015 was to manage the reduction in staff numbers, together with the transfer of posts to Executive Agencies and the shift of activities towards a policy-oriented DG.

Horizontal Objective 5: To ensure the optimal allocation of staff to allow the DG to achieve its mission and objectives, including human resource management and forward planning		
Indicator	Number of posts offset in the context of staff reduction and handover to EAs (data source: Sysper2)	
Baseline	Target (2015)	Result
N/A	87 Establishment Plan Posts (AD/AST)	83 Establishment Plan Posts (AD/AST)
	30 Contractual Agent Posts	30 Contractual Agent Posts

The target for Contractual Agent posts was achieved. The result for Establishment Plan posts fell short by four posts, a result of a revision of two Directorates' internal objectives. Despite this difference, DG RTD nevertheless fulfilled the objective set by the central services on offsetting in the context of handover to EAs and staff reduction and redeployment.

New Management Modes

DG RTD's objective for 2020 is to establish a comprehensive, efficient and effective governance and administration model and become a reference service in the New Management Modes methodologies.

Particular challenges for 2015 were to monitor the management of activities of Executive Agencies, together with the organisation of an effective governance framework (MoUs), to launch the 3-year evaluation of REA and ERCEA and to further enhance the consistency/harmonisation of the second generation of JTIs.

Horizontal Objective 6: To monitor the management of resources and activities by Executive Agencies (EAs) and ensure the consistency of the new generation of JTIs		
Indicator Successful launch of the 3-year evaluation of the REA and ERCEA		
Baseline	Target (2015)	Result
N/A	Launched	Achieved
Indicator Update and application of the MoUs for the Executive Agencies in view of established and finalised business processes		
Baseline	Target (2015)	Result
N/A	All MoUs signed in 2014 to be kept up-to-date in 2015 when all business processes are expected to be finalised	Achieved
Indicator To prepare common templates for JUs management (KPIs, AAR, AWP, etc.)		
Baseline	Target (2015)	Result
N/A	All templates ready and in application	Achieved
Indicator To reply timely to the interservice group consultations related to the preparation of the common RTD position for the Governing Boards (GB).		
Baseline	Target (2015)	Result
N/A	100% ⁶⁴	Achieved

Other horizontal activities

Results for the other horizontal activities (i.e. financial management, internal control and risk management, cost-efficiency, time-to-grant, legality and regularity of operations and anti-fraud strategy) are included in Part 2.

⁶⁴ Timeliness measured based on dates of Governing Board meetings and internal (DG RTD) preparatory documents.

2. MANAGEMENT AND INTERNAL CONTROL

Assurance is an objective examination of evidence for the purpose of providing an assessment of the effectiveness of risk management, control and governance processes.

This examination is carried out by management, who monitors the functioning of the internal control systems on a continuous basis, and by internal and external auditors. Its results are explicitly documented and reported to the Director-General. The reports produced are:

- The reports submitted by the Directors, which include the outcome of the internal control monitoring taking place in each Directorate;
- The reports from Authorising Officers in other Directorates-General managing budget appropriations in cross-delegation;
- The reports on control results from entrusted entities in direct management as well as the results of the Commission supervisory controls on the activities of these bodies;
- The contribution of the Internal Control Coordinator (ICC), including the results of internal control monitoring at Directorate-General level;
- The annual report on the ex-post audit function;
- The observations and recommendations reported by the Internal Audit Service (IAS);
- The observations and recommendations reported by the ECA.

These reports result from a systematic analysis of the evidence available. This approach provides sufficient guarantees as to the completeness and reliability of the information reported and results in a complete coverage of the budget delegated to the Director-General of DG RTD.

This section reports the control results and other relevant elements that support management's assurance. It is structured into (a) Control results, (b) Audit observations and recommendations, (c) Effectiveness of the internal control system, and resulting in (d) Conclusions as regards assurance.

Overview of the resources under DG RTD's control

DG RTD's overall responsibilities for the budget "Research and Innovation"

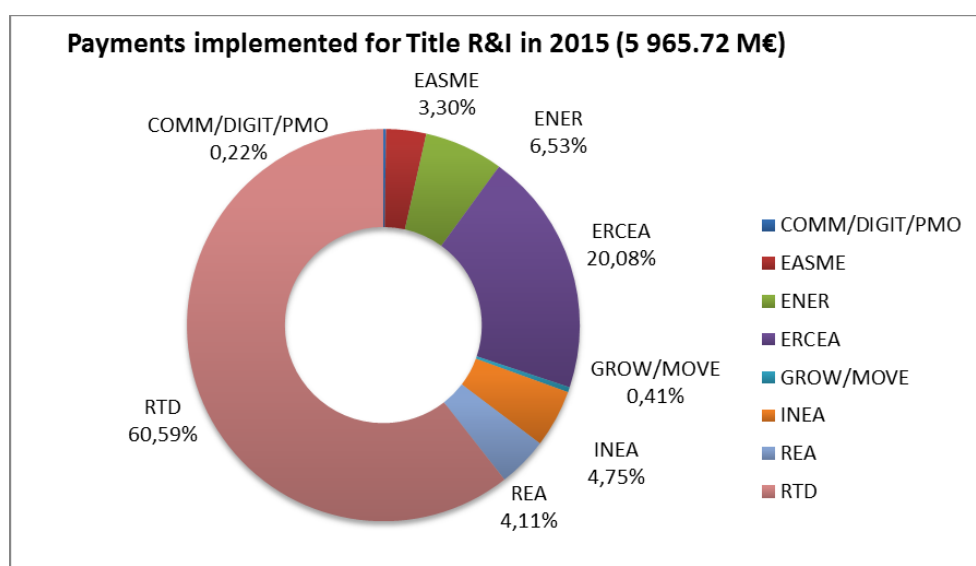
DG RTD negotiates the Title 08 "Research and Innovation" of the budget of the European Commission and coordinates and monitors its implementation, *in fine* entrusted to the whole Research Family. DG's and Executive Agencies receive delegation directly from the College (see *first pie chart*), Joint undertakings and other bodies receive their budget from DG RTD (see *second pie chart*). The Title 08 contains expenditure related to

- Administrative charges dedicated to Research and innovation;
- Research FPs⁶⁵;
- Euratom;
- ITER;
- Coal and Steel.

Amongst these items, the FPs represent the most important part, in quantitative terms. This explains that this report will mostly focus on this part of the budget.

In 2015, under the Budget Title Research and Innovation (Title 08), a total amount of EUR 5 965.72 Million was implemented in 2015, in terms of payments. Out of this, DG RTD was responsible for 60.59%, being EUR 3 614.9 Million. This implies that 39.41% of the Title 08 budget in payment in 2015 was authorized by other entities.

Chart 1 - Payments implemented for Title 08 in 2015 (Credits C1)



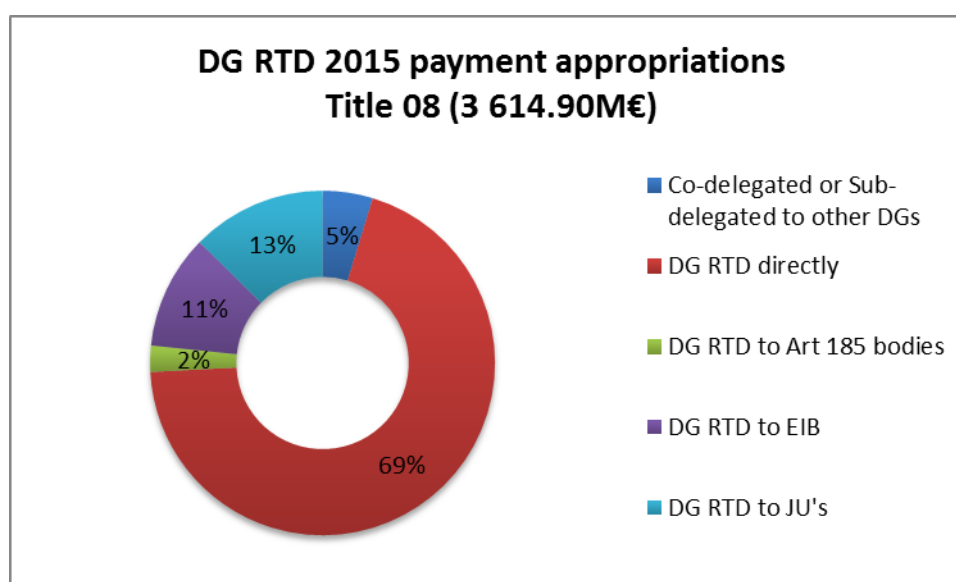
DG RTD's payment appropriations (EUR 3 614.9 Million) under Title 08 and fund source C1⁶⁶ were implemented for the following main items.

⁶⁵ Nota bene: The current *Horizon 2020* FP is not exclusively funded by the budget line 08. Other Titles are also contributing (02, 09 etc...)

⁶⁶ Credits voted for the year and EFTA contributions.

Table 1 - Payment Appropriations 2015 (Credits C1)

Title 08 - Payment Appropriations 2015 for DG Research and Innovation (voted budget and efta contribution)			
AOD	Management mode	Execution	
		amount (in € million)	% part
RTD	Co-delegated or Sub-delegated to other DGs	170,30	5%
RTD	DG RTD directly	2.510,88	69%
RTD	DG RTD to Art 185 bodies	88,82	2%
RTD	DG RTD to EIB	387,78	11%
RTD	DG RTD to JU's	457,12	13%
Total		3.614,90	100,00%

Chart 2 - DG RTD payment appropriations (Credits C1) on Title 08

In addition, to these figures, it has to be noted that

- DG RTD also authorized in 2015 payments under other budget Titles (EUR 12.33 million) and fund sources⁶⁷ (EUR 183.05 million), which are included in the further tables and figures.⁶⁸ This increases the total amount paid in the year to EUR 3810/3811 million (as per AAR Annex 3).

The previous figures demonstrate that DG RTD plays an important role as the head of the Research Family, and that its coordination responsibilities go far beyond the directly implemented budget amounts.

DG RTD and the Research Family

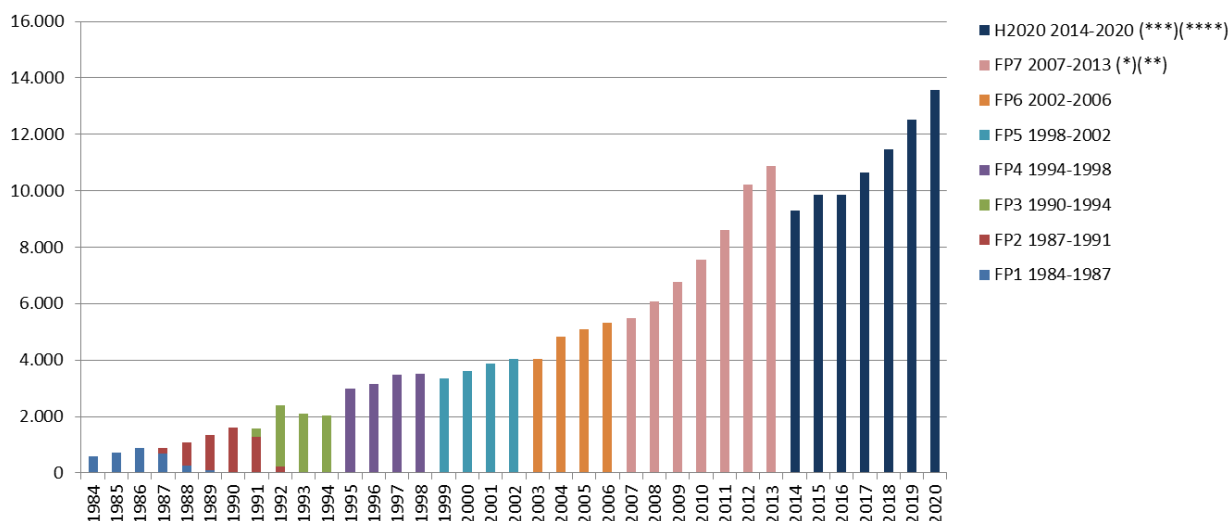
In order to understand the control framework that is presented in this annual report, it is important to capture the overall responsibilities that DG RTD has in the implementation of FP7 and the Horizon 2020 FP.

⁶⁷ Assigned revenues, for example.

⁶⁸ Nota bene: the *budget implementations* figures are not to be directly compared to the *payment* figures (later tables), as the context and the parameters of the related database queries are both different.

As the financial volumes dedicated to Research in the European budget are increasing, DG RTD's responsibilities are extended from FP to FP. The management modes have to be adapted to this evolution.

Chart 3 - Evolution of the Research FP



* ITER included for a total budget (2007-2013) of 3273,420 Million EUR

** CIP and EIT excluded

*** ITER excluded, the total budget (2014-2020) is 2987,407 Million EUR

**** The figures of Budget 2016-2020 are not definitive and may still change

"New" management modes for the programmes' implementation

The responsibility to implement the Research FPs is shared amongst different Directorate-Generals. In order to focus on core institutional tasks, these Directorate-Generals have delegated parts of the contract management regarding research grants to Executive Agencies, Joint Undertakings and so called Article 185 bodies (partnerships with the Member States).

This multitude of actors involved in the implementation of the research FPs is referred to as the "Research Family", and requires a sophisticated governance model that ensures:

- Coordination and Coherence in the setting up of the research agenda to be supported under the FPs (in particular strategic programming and work programmes);
- That Directorate-Generals can focus on policy-making by delegating grant management tasks to Executive Agencies and other "external bodies";
- The coherent implementation of the grant management process through all the bodies involved in grant management (Directorate-Generals, Executive Agencies, Joint Undertakings, etc.).

One important element of the Commission's proposal in the context of the MFF 2014-2020 was to simplify and rationalise further the administration of EU institutions, agencies and bodies to make it a modern, effective and dynamic organisation, while reducing staffing by 5% over 5 years. Within this context the Commission has decided to make the best use of reduced human resources by focusing on its core institutional tasks, such as policy making, implementation and monitoring of the application of EU-law, whilst guaranteeing the most effective and efficient implementation of spending programmes for which it remains ultimately responsible. In view of the positive experience of management of EU-programmes by the executive agencies, it has also decided to make more use of the existing executive agencies to implement parts of the

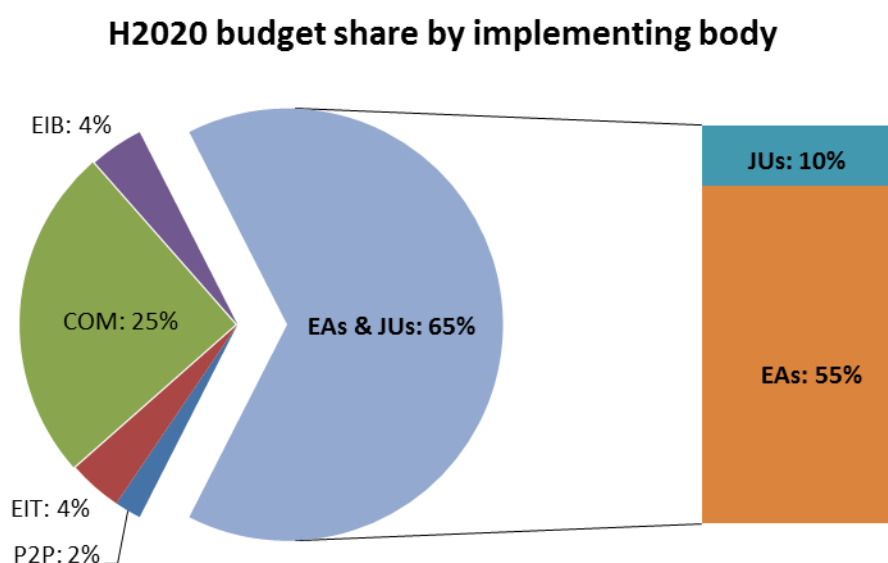
spending programmes.

These principles have been fully implemented in Horizon 2020 and much greater recourse to management modes other than from direct, in-house management by the DG is made. Apart from some implementation activities that will remain within the DG (e.g. health, key enabling technologies), Horizon 2020 will be implemented in addition to the DG by:

- 4 existing executive agencies;
- PPPs with industry;
- P2Ps with Member States;
- Innovative financial instruments implemented by the EIB and the EIF;
- The European Institute for Innovation and Technology (EIT).

As to the extent of the recourse of new management modes, in its 2011 Communication on the 2014-2020 MFF, the Commission announced a target of 66% for the share of the Horizon 2020 budget to be managed externally. Currently, 75% of the Horizon 2020 budget is foreseen to be managed externally.

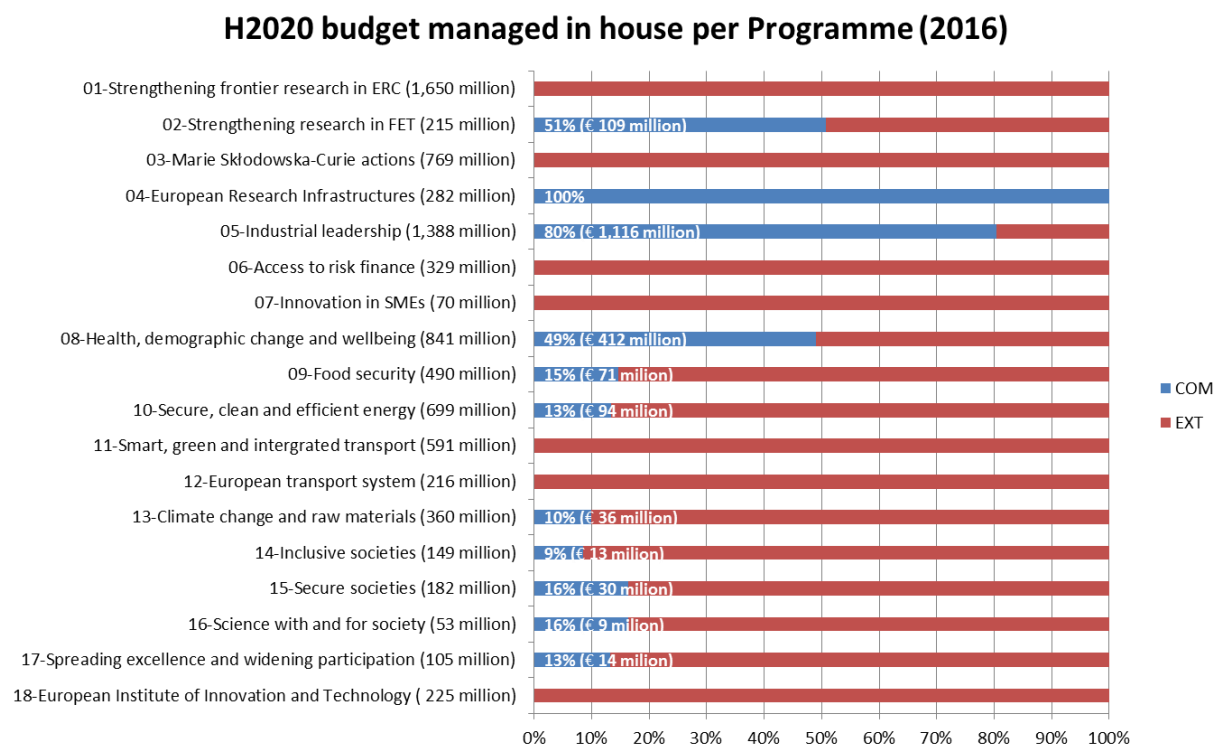
Chart 4 - H2020 budget share by implementing body



The figure shows the share of each management mode in the management of the Horizon 2020 operational budget of EUR 70.4 billion (current prices). Some 25% will be managed internally, i.e. directly by different Commission DGs, while 75% will be managed by external implementing bodies, breaking down into 55% to be managed by Executive Agencies, 10% by PPPs, 4% by the EIB, 4% by the EIT, and 2% by public-public partnerships.

It is interesting to observe that the delegation of the programme implementation covering the evaluation of proposals and the full project cycle of R&I grants management also depends on the different research topics. The following chart gives an overview of this for the 2016's budget.

Chart 5 - H2020 budget managed in house per Programme (2016)



DG RTD coordinates the research family

In the light of the diversity of implementing bodies, effective coordination within the Research Family is essential and DG RTD, as the lead DG of the Research Family, invests important resources in the coordination of the Research Family and the programmes' implementation.

Chart 6 synthesises the current organisation of Horizon 2020's implementation. It differentiates the stages of the grant management system that are organised and managed mostly *at family level* (programming, calls, audits – with blue shadow), and the others, involving the concrete financial transactions, that are implemented *under the responsibility of each Authorising officer* (DG's and other services, taken individually – with grey shadow).

DG RTD has the global coordination responsibility in the management of the whole H2020, even for those parts that are not in its proper budget appropriations and which are not included in the assurance given at the end of this report.

Chart 6 - Horizon 2020 organisational set up



The Common Support Centre

The implementation of FP7 through different Directorate-Generals and other actors was characterised by the use of divergent practices across different parts of the programme. Observing this, the ECA, supported by the European Parliament and the Council, called for the consistent and uniform treatment of all beneficiaries and the coherent implementation of the FP. This is even more important as, in the implementation of Horizon 2020, the number of actors increases.

In response to these challenges, the Commission first and foremost developed a single set of simplified rules for participation and dissemination to be applied throughout Horizon 2020 by all implementing bodies.

It also created a Common Support Centre (CSC), which will help to coordinate and deliver the programme in an efficient and harmonised manner across seven Commission Directorates-General, four Executive Agencies, and six Joint Undertakings.⁶⁹

In order to reach these objectives, the CSC provides as of 1 January 2014 common services in legal support, ex-post audit, IT systems and operations, business processes, programme information and data to all research DGs, executive agencies and Joint Undertakings implementing Horizon 2020. On the request of the participating entities, the CSC currently discusses the possible extension of its mandate to include additional tasks.

The CSC contributes to the uniform treatment of the beneficiaries, to the efficient and consistent implementation of the programmes, ensure political and administrative accountability through

⁶⁹ The operating rules of the CSC were adopted by Commission Decision C(2014)2656, these include information on the CSC governance, the responsibilities of the various parties involved, the missions and tasks of each service as well as staff and budgetary issues: the CSC is part of RTD, as one of its directorates. For administrative and day-to-day operational matters, the CSC is accountable to the Director-General of RTD. It is overseen by a Steering Board made up of all Directors-General with authorising officer responsibility for Horizon 2020.

- streamlined, harmonised and rationalised business processes;
- trainings and improved documentation linked to the programme and project implementation;
- a single set of common IT tools to be used by all implementing services and all participants;
- a common interpretation of the single set of rules and a common control strategy;
- the consolidation and dissemination of results and data generated by projects managed by different actors ;

2015 was a period during which the CSC consolidated its role and priorities.

The Common Legal Support Service had to deal with requests coming from the Research family members and faced a number of ad-hoc politically important and complex files. Reaching a common position in those files is crucial for a smooth implementation of the programme.

The Common Audit Service established the project for the common audit strategy for Horizon 2020⁷⁰ and progressed in the implementation of the FP7's one.

The Common Business Process unit continued to provide support and assistance to the Research Family members. It played an important role on the harmonisation and simplification of processes in four main areas:

- *Support to the business process owners* (assistance, harmonisation and simplification of processes, documentation of processes, Business specifications for IT systems);
- *Participant Portal and e-Communication Office*;
- *Communication and assistance to internal users* (analyse training needs and implement trainings on H2020, operate the GoFund online platform as the single source of information for all services implementing H2020 and assist individual users),

For the Common IT Service, 2015 was an important year to consolidate and show the robustness of the H2020 IT systems. The challenges ahead are to make available the missing functionalities for Horizon 2020 whilst continuing the efforts for business harmonisation in the Research family. Another challenge will be the extension of the use of the IT tools by other non-Horizon 2020 granting programmes.

As for the service providing Programme information and data, it fulfilled the Commission's reporting requirements with respect to data and information related to the Research FPs. It defined and implemented the common dissemination strategy of EU research project results, thus enabling and fostering their exploitation by policy services. It also continued to progress in the development of performance indicators to make a constant follow up of the situation.

On the request of the participating entities, the CSC currently discusses the possible extension of its mandate to include additional tasks.

Resources used by DG RTD in 2015

This section presents the use of resources in 2015, under the responsibility of DG RTD.

⁷⁰ Presented to the Governing Board of the Common Support Center on the 04/12/2015.

The resources are composed from the implemented budget expressed in payments authorized in DG RTD and from the human resources.

Budget implemented by DG RTD in 2015

The Table 2 gives an overview of the payments authorized by DG RTD in 2015 under different programmes (legal base) and management modes (direct/indirect).

Table 2 – Payments authorized in 2015 per programmes/management modes

Authorized payments in DG RTD in 2015 (M€) (Cross-subdelegations included)										
Credit type	ADMIN		ADMIN	OPERATIONAL				OPERATIONAL	Grand Total	%
Legal base	H-2020	RFCS		H-2020	Previous FPs	VII	RFCS			
Management mode implementing body										
Total Direct	28,26	0,07	28,33	998,58	6,68	1.489,52	45,11	2.539,88	2.568,22	67,40%
RTD	28,26	0,07	28,33	998,58	6,68	1.489,52	45,11	2.539,88	2.568,22	67,40%
Total Indirect	245,68	0,20	245,89	693,70	4,27	298,20	-	996,17	1.242,06	32,60%
Art 185 bodies	-	-	-	47,17	4,27	39,06	-	90,51	90,51	2,38%
EIB/EIF	-	-	-	408,18	-	-	-	408,18	408,18	10,71%
Executive Agencies	93,13	-	93,13	-	-	-	-	-	93,13	2,44%
Joint Undertakings	3,00	-	3,00	230,76	-	246,18	-	476,93	479,93	12,60%
Other DG's	149,55	0,20	149,76	7,58	-	12,96	-	20,54	170,30	4,47%
Grand Total	273,95	0,27	274,22	1.692,28	10,95	1.787,72	45,11	3.536,06	3.810,28	100,00%
%	7,19%	0,01%	7,20%	44,41%	0,29%	46,92%	1,18%	92,80%	100,00%	

In 2015, DG RTD managed directly 67.40% of its budget expressed in terms of payments. 32.6% of the payments went to other entrusted bodies, to be finally implemented by them.

Table 3 gives another overview of the implemented budget, following the different control systems under which the payments were authorized. Indeed, the controls applied for a payment are different if it's a commercial invoice (procurement), a reimbursement of a cost claim (grants), of an expert (cost reimbursement) or the payment of the amounts entrusted to other implementing bodies.

Table 3 - Payments authorized in DG RTD by control system

Credit type	ADMIN	OPERATIONAL	ALL	%
Ctrl system	Amount (€)	Amount (€)	Total Amount (€)	
<i>Administrative</i>	2.351.199,16		2.351.199,16	0,06%
<i>Experts contracts</i>	-	4.331.966,59	4.331.966,59	0,11%
<i>Grants</i>		2.485.970.597,97	2.485.970.597,97	65,24%
<i>Procurement</i>	25.983.185,10	49.581.300,40	75.564.485,50	1,98%
<i>Financial instruments</i>		408.181.780,77	408.181.780,77	10,71%
<i>Subsidies entr. entities</i>	96.131.931,94	567.446.248,26	663.578.180,20	17,42%
<i>Cross-subdelegations</i>	149.756.280,35	20.544.347,18	170.300.627,53	4,47%
Grand Total (€)	274.222.596,55	3.536.056.241,17	3.810.278.837,72	100,00%
%	7,2%	92,8%	100,0%	

These figures confirm that the main management mode for the budget implemented by DG RTD in 2015 is direct grant management (*Grants*), with 65.24%.

Directly managed *administrative*, *experts* and *procurement* related payments amount to a total of 2.15% of the expenditure.

28,14% is entrusted to other entities outside the Commission, mostly to implement parts of the framework programmes under (*indirect*) *grant management* and *financial instruments* control systems.

4.47% of the 2015 payments have been authorized under cross-subdelegations to other Commission DG's. The major part of this is related to the salaries.

As a consequence, this report focuses on (direct and indirect) grant management and presents the financial instruments but does not detail the other control systems.

Assurance on this expenditure is provided by DG RTD directly or through its supervisory arrangements, together with a variety of delegated bodies that implement a part of the budget on its behalf.

Grant management control system

In order to achieve both operational (research-related) and financial objectives DG RTD has established a control framework to mitigate the inherent risks at the different stages of the direct grant management process and the indirect grant management.⁷¹

This control framework must, however, be cost-effective and not cause excessive administrative burdens to researchers and participants. DG RTD therefore operates a system of targeted controls before payment. It bases its main assurance on in-depth checks carried out on-the-spot after costs have been incurred and declared.

The Research Directorate-Generals have defined and implemented a common control strategy for FP7, the key elements of which are the ex-post audit strategy and the recovery process.

In order to further improve the overall efficiency and coherence of the FP's implementation, the CSC develops for Horizon 2020 corporate processes and tools. This should lead to a streamlined control environment with embedded automatic controls whenever possible.

Financial instruments control system

DG RTD has delegated the implementation of its financial instruments to two international bodies; the EIB and the EIF.

As delegated bodies, EIB and EIF have a responsibility for how they carry out their tasks. However, RTD in its role as delegating body and AOR, also has a responsibility to supervise these bodies' implementation from the Commission's side. Therefore, RTD has established a supervision strategy for these instruments. This strategy aims to ensure that the financial as well as the research-related objectives are achieved.

The general strategy chosen is a supervision based on the establishment of clear rules, the examination of reports and the approval of key documents, but with a hands-off approach to detailed management issues, leaving the EIB and EIF a reasonable freedom to implement the programmes. Nevertheless, in the event that seriously adverse information about the non-achievement of a key control objective should come to DG RTD's knowledge, the delegating acts give the Commission the right to intervene more deeply in the operations of the EIB and EIF.

Budget cross-subdelegated/co-delegated to other services

As in previous years, DG RTD has delegated a number of activities to different services within the Commission.

In 2015, DG RTD cross-subdelegated/co-delegated EUR 170.3 Million of its payment appropriations (administrative and operational credits) to the entities listed in Table 4 below. The major part of this amount is related to the salaries (PMO).

⁷¹ For further details of the control systems, see Annex 5.

Table 4 - Budget cross-subdelegated/co-delegated to other services in 2015

Credit nature/AOSD	Amounts per Legal Base		VII	Grand Total
	FCA	H2020		
ADMIN	204.447,52	149.551.832,83		149.756.280,35
RTD/SANTE		25.000,00		25.000,00
RTD:HR		35.451,00		35.451,00
RTD:OP		88.519,50		88.519,50
RTD:PMO	204.447,52	140.636.235,81		140.840.683,33
RTD>DEVCO		2.665.413,00		2.665.413,00
RTD>DIGIT		5.744.040,84		5.744.040,84
RTD>SCIC		357.172,68		357.172,68
OPERATIONAL		7.583.636,18	12.960.711,00	20.544.347,18
RTD/CNECT		499.980,50		499.980,50
RTD/ENER		252.250,00	3.015.828,88	3.268.078,88
RTD/GROW		1.286.011,94		1.286.011,94
RTD/JRC			511.086,61	511.086,61
RTD/MOVE			9.033.865,22	9.033.865,22
RTD:PMO		700.000,00		700.000,00
RTD>OP		4.845.393,74	399.930,29	5.245.324,03
Grand Total	204.447,52	157.135.469,01	12.960.711,00	170.300.627,53

Being a Commission service itself, the AOR of services receiving delegation is required to implement the appropriations subject to the same rules, responsibilities and accountability arrangements.

The cross-delegation agreements require the AODs of cross-delegated services to report on the use of these appropriations. The reports on the sub-delegations received from other DGs and offices did not provide any indication of any particular unfavourable observation with regard to the regularity and legality of the transactions concerned.⁷²

Human resources

The effects of an increased recourse to new management modes, linked to the offsetting of the staff in DG RTD, as well as the Commission's commitment to reducing staff numbers, and the redeployment taxation imposed on DG's have had a considerable impact on the human resources available in the DG.

From a workforce of around 2 000 in 2010, and around 1 800 in 2014, staff numbers progressively reduced to around 1 650 in 2015 and are projected to be reduced to 1 150 by 2020. As of 1 February 2016, the 'Dotation' of the DG is 1566 posts (AD/AST/CA/END/LA).

This reduction is the net result of a number of factors:

- the consequence of the offsetting due to the delegation to the Executive Agencies
- the creation of a Common Support Service in DG RTD for Horizon 2020 activities across the entire Research Family of DG's;

⁷² The amounts subdelegated to other authorizing officers by DG RTD in order to implement FP7 projects (RTD/ENER; RTD/MOVE, amounts in red) will be included in the scope of DG RTD reservation.

- the reduction due to the commitment of the Commission to reduce staff;
- the need to ensure coordination across the different implementing bodies and to ensure their supervision;
- an increase in work to support research policy.

In continuing its efforts to improve its Human Resource management and in order to tackle the challenge of having to constantly reduce its staff and still achieve its mission and objectives in the years to come, in early 2015 the DG followed up on the results of its Human Resources Planning Process (HRPP) which had taken place during the end of 2014. By screening the DG's activities, and by using workload and performance indicators, the Director General made decisions on staff re-allocation and staff reduction targets per entity (directorate / unit).

In 2015, around 34% of the DGs human resources were used on policy and programme design to support the wider DG RTD policy. The outcomes of this policy-related work are non-financial, and are set out in Part 1 of this report. Another 22% of staff worked directly on programme implementation - managing grants to participants in the FPs. Over time the proportion of staff working on policy-related work can be expected to increase, especially as much of Horizon 2020 will be managed by delegated entities. 29% of staff work in support and coordination functions and **15% of staff work in the CSC, providing services to the Research Family on Horizon 2020.**

2.1 Control results

This section reports and assesses the elements identified by management that support the assurance on the achievement of the internal control objectives⁷³. The DG's assurance building and materiality criteria are outlined in the AAR Annex 4. Annex 5 outlines the main risks together with the control processes aimed to mitigate them and the indicators used to measure the performance of the control systems.

Table 5 Summary of the 2015 control results related to the Internal Control Objectives

CREDIT TYPE Ctrl system Legal base	Total amount paid in 2015 (M€)	Conclusion on cost- effectiveness and efficiency	Detected/estimated Error Rate	Reservation	Conclusion on other ICOs
ADMIN					
Admin					
H-2020	2.351.199,16	Positive	0-2%	N	Positive
Cross-subdelegations					
H-2020	149.551.832,83	Positive	0-2%	N	Positive
RFCS	204.447,52	Positive	0-2%	N	Positive
Procurement					
H-2020	25.912.668,60	Positive	0-2%	N	Positive
RFCS	70.516,50	Positive	0-2%	N	Positive
Subsidies					
H-2020	96.131.931,94	Positive	0-2%	N	Positive
OPERATIONNEL					
Cross-subdelegations					
H-2020	7.583.636,18	Positive	0,00%	N	Positive
VII	12.960.711,00	Positive	4,47%	R1	Positive
Experts contracts					
H-2020	3.517.883,27	Positive	0-2%	N	Positive
VII	311.903,89	Positive	0-2%	N	Positive
RFCS	502.179,43	Positive	0-2%	N	Positive
Financial instruments					
H-2020	408.181.780,77	Positive	0-2%	N	Positive
Grants					
H-2020	977.899.218,41	Positive	0,00%	N	Positive
VII	1.459.462.433,65	Positive	4,47%	R1	Positive
Previous FP's	3.941.643,48	Positive	2,45%	N	Positive
RFCS	44.667.302,43	Positive	4,62%	R2	Positive
Procurement					
H-2020	17.163.389,89	Positive	0-2%	N	Positive
VII	29.745.637,29	Positive	0-2%	N	Positive
Previous FP's	2.734.545,94	Positive	0-2%	N	Positive
RFCS	-62.272,72	Positive	0-2%	N	Positive
Subsidies					
H-2020	277.932.592,68	Positive	0-2%	N	Positive
VII	285.240.800,00	Positive	0-2%	N	Positive
Previous FP's	4.272.855,58	Positive	0-2%	N	Positive
Total	3.810.278.837,72				

The above table summarizes the main results of the monitoring of DG RTD's internal control system. Positive conclusions have been reached related to the efficiency and cost-effectiveness indicators, to the mitigation of the fraud risk and to the safeguard of the

⁷³ Effectiveness, efficiency and economy of operations; reliability of reporting; safeguarding of assets and information; prevention, detection, correction and follow-up of fraud and irregularities; and adequate management of the risks relating to the legality and regularity of the underlying transactions, taking into account the multiannual character of programmes as well as the nature of the payments (FR Art 32).

financial assets. Mostly positive conclusions have been reached on the legality and regularity of the underlying transactions, with the exception of FP7 and RFCS.

Further details follow in the subsequent sections of this chapter.

2.1.1 Efficiency and Cost-effectiveness

Based on an assessment of the most relevant key indicators and control results, DG RTD reached a positive conclusion on the cost-effectiveness and the efficiency of the control system.

Indeed, the efficiency measured in terms of Time-to-Grant, Time-to-Inform and Time-to-Pay follows a good trend and is considered as satisfactory (93-100% compliance). The cost-effectiveness of the controls shows an overall ratio of 2.28% for direct grant management, and 0.55% for indirect grant management, which is also considered as reasonable.

The following chapter gives details firstly on the efficiency related indicators, and secondly on the overall cost-effectiveness of the control system.

Efficiency of the controls

Expenditure under direct management

This section presents the main efficiency performance indicators for the activities carried out in DG RTD: grant management for FP7 and H2020 in one hand and for Coal and Steel in the other.

The report does not detail the part of the budget implemented under other control systems, as they are not significant compared to the grants.

FP7/ H2020 Grant management control results

In 2015, two FPs were implemented in DG RTD. The management of these programmes is presented by control stages, with a varying scope depending on the stage and the programme.

Table 6 - Scope of the efficiency/performance indicators in this report

Stage	Scope of the indicators for 2015 (data available)			
	FP7		H2020	
	Research Family	RTD only	Research Family	RTD only
1. Programming and evaluation	NO	NO	YES	YES
2. Grant preparation	NO	NO	YES	YES
3. Monitoring of the projects	NO	YES	NO	YES
4. Ex-post audit	YES	YES	NO	NO

The FP7 legacy represents in DG RTD, at the end of 2015, 3035 completed and closed grant agreements out of 4950 and 1915 outstanding projects, with up to EUR 1.63 billion still to be paid. 826 final payments took place in 2015. Ex-post audits carried out in 2015 are dedicated exclusively to FP7.

FP7 projects still running in 2015, for DG RTD

- 1 915 grant agreements with a RAL of EUR 1.631 million
- 826 final payments in 2015
- overall EUR 1 493.79 million paid

Horizon 2020, started with the first calls in December 2013 represents 528 agreements signed in DG RTD, out of which 342 was signed in 2015. Payments authorized for H2020 projects are almost exclusively prefinancing. No audit has yet been carried out for this programme.

Stage one: Programming and evaluation

The first stage concerns the preparation of calls, the calls for proposals, and the evaluation of proposals.

Overall control objective

The overall control objective is to evaluate the project proposals in order to ensure scientific excellence (selection of the best projects) and the achievement of the operational objectives set out in the specific work programmes, as adopted by the Council and the Parliament. Proposals are reviewed by panels of external reviewers, who are experts in the scientific field.

Scope

Being a corporate business process for the Horizon 2020 implementing bodies, this section reports data related mainly to the research family. DG specific indicators are available for the last act of the stage: the information sent to the successful projects.

Risk based key controls

Key controls include the screening of proposals for eligibility, the choice of independent evaluators, the evaluation by a minimum of three evaluators, and a panel review for the ranking of proposals. The list of approved proposals is checked for legal compliance by the AOSDs before it is submitted for a Commission inter-service consultation.

These are key checks to ensure the excellence of the science to be funded and the legality and regularity of operations, since a compliance deficiency in the selection process would affect the regularity of all the ensuing grants.

A corporate approach for more efficiency

The planning of the work programmes and of the calls is organized in common for the Research Family.

DG RTD coordinated the establishment of the H2020 work programme for 2014-15 and followed its implementation. For a better efficiency of the whole system

- some sub-processes of this stage are entrusted to REA (validation of the beneficiaries, SME qualification, experts' management, etc.);
- a corporate technical support is provided by the Participant portal for the publication of all the calls and the dissemination of the related reference documents, and by the common IT tools for the evaluation phase.

Control results

Between the launch of Horizon 2020 and the end of 2015, 198 calls were published and 158 out of them were concluded for the whole family.⁷⁴ A total of 78 268 proposals were received in response to these calls. Of those, 77 724 proposals – requesting in total an EU financial contribution of EUR 197 billion – were eligible.

⁷⁴ DG's, Executive Agencies, Joint Undertakings. All type of calls included.

For the aforementioned concluded calls one proposal was retained for funding for, on average, about seven eligible proposals. This figure, stable since 2014, demonstrates the attractiveness of the H2020 programme and the competitiveness of the call process. It also underlines the importance of a good evaluation

Family Picture

H2020 calls' competitiveness

Around 1 in 7 eligible proposals retained for funding

process, as the most excellent projects need to be chosen from a large number of proposals.

Family Picture

Time-to-Inform in 2015 H2020

97,9% on time

The main efficiency indicator of this stage is the Time-to-Inform. For the grants that were signed in 2015, DG RTD succeeded to respect, in 100% of the cases, the objective of a maximum of 5 months spent between the

call's deadline and the moment the applicants are informed of the results of the evaluation.

Stage two: Grant preparation (contracting)

The second stage concerns the preparation and award of contracts.

Overall control objective

The overall objective of this stage is the translation of each of the retained scientific research proposals into a legally binding contract allowing for the management of both the scientific and financial aspects of the project.

Scope

In 2015 this stage concerned Horizon 2020.

Risk based key controls

As well as the first stage, the second relies on corporate business process and IT tools, with the aim to ensure equal treatment of the beneficiaries and an efficient use of the scarce time dedicated to the finalization of the contracts.

In addition to the basic checks of the participants, risk based checks are undertaken in order to prevent or mitigate fraud and other risks (operational capacity, financial capacity).

A corporate approach for more efficiency

IT tools, business processes and some verifications are organized at Research Family level. The new legal entities undergo the validation process in REA, no matter which is the implementing body finalizing the contract.

Control results

In RTD, 342 grant agreements were signed in 2015 for H2020, for a total EC contribution of EUR 1 967.8 million. The total budgeted costs of these projects is EUR 2 539 million.

The main performance indicator is the Time-to-Grant (TTG). This is important as participants, especially Small-and-Medium-Sized Enterprises, want a quick

Family Picture

Time-to-Grant in 2015 H2020

94,9% on time

answer to their proposals. Nevertheless, it needs to be noted that a shorter TTG does bring some risks as it reduces the time available for the Commission to carry out extensive checks before signing grants.

*Picture for DG RTD
Time-to-Grant in 2015 H2020
93% of grants signed on time
222 days on average*

In 2015 the TTG was respected in 93% of cases against the H2020 target of 8 months, with an average TTG of 222 days. For the whole research family over 94,9% of grants were signed within the deadline⁷⁵.

Stage three: Monitoring the projects' implementation

The third stage concerns the management of the project and the contract, from the prefinancing and the final payment.

Overall control objective

The overall objective of the stage is to ensure the successful implementation of the granted projects mostly by timely and regular payments to the beneficiaries. Regular preventive controls as kick-off meetings and information sessions, trainings, communication campaigns etc. take place in order to prevent errors or fraud in the reimbursement of the costs claimed.

Monitoring the results of the projects contributes to the overall evaluation of the programme's impact. For FP7, the ex-post evaluation was published in January 2016.⁷⁶

Scope

In 2015, prefinancing was paid for H2020 projects, and costs claims reimbursed for mostly FP7 projects.

Risk based key controls

This stage covers the normal management of the contract over its lifetime: the monitoring of the project implementation and the payments against the cost claims with all the necessary ex-ante checks. These ex-ante checks include audit certificates on cost statements established by external auditors, and the processing of transactions through Commission financial circuits.

Control results

DG RTD managed 3187 ongoing projects in 2015:

- 2711 open contracts for FP7 at the 1st of January;
- 476 contracts for H2020, signed before the end of December.

For the 3693 payments that were done in 2015 for grants⁷⁷, details are in Table 7a below.

The efficiency of this stage is measured by the indicator 'Time-To-Pay' (TTP), which is defined as the percentage of payments made within the binding deadlines. Regarding grants, 95% of the payments authorized in 2015 by DG RTD were done in time. This

⁷⁵ Without taking into account the grants signed by ERCEA, as the 8 months deadline is not binding in its case.

⁷⁶ For details, see part 1 of the AAR.

⁷⁷ Under all the programmes (H2020, FP7, Euratom)

confirms a good trend since 2013, and highlights the good performance of the payment workflows and the evolving IT environment.

Table 7a - Evolution of the TTP for grants in DG RTD (%)

Expenditure type	2012	2013	2014	2015
Research grants payments	73%	93%	94%	95%

Table 7b - Average net and gross TTP for grants in DG RTD in 2015

Payment type	Payments			
	Nr	Average time (calendar days)		
		Net	Suspension	Gross
RTD – H2020 payments PreFin	397	9	0	9
RTD – FP7 payments	2 152	55.4	51.4	106.8
RTD – Other grants – not FP7	1 144	29.4	41.8	71.2
	Gross = Beneficiary's point of view, ie Net + Suspensions			

As shown in Table 7b the average total time taken to pay is within the payment time limits imposed by the Financial Regulation and the respective contracts. However, DG RTD is aware that, in some cases, the total ('gross') time to pay is longer, because of the possibility, set out in the Financial Regulation, to suspend the payment deadline if information is missing or incomplete.

DG RTD is committed to smoothing the process by further simplification of internal procedures and better IT tools and guidance to beneficiaries. Compared to 2014, the average suspension time of FP7 payments has been reduced from 65.8 to 51.4 days, with an overall improvement of the gross TTP by -12.3 days.

Stage four: Ex-post controls and recoveries

The fourth stage includes the ex-post audits as well as the recovery of any amounts found to have been paid in excess of the amount due.

This section focusses on the audit work carried out in 2015 and its follow-up actions. The results of the audits, namely the error rates, are detailed in the section dedicated to the control results in terms of *effectiveness*.

Overall control objective

Detailed ex-ante controls represent a considerable administrative burden on beneficiaries and the Commission, as they require the transfer of large amounts of information and its detailed checking. This has a seriously negative impact on the time to grant and the time to pay beneficiaries. For this reason the Research family has decided to obtain *most of its assurance from ex-post controls*.

In addition, the implementation of the ex-post audit results has an important '*cleaning*' effect on the budget. It is expected for FP7, that the Representative Detected Error Rate around 5% is to be reduced to around 3%, after the corrections are applied.

Scope

For 2015 this stage covers exclusively expenditure under FP7 (with a very small proportion for FP6 and the Coal and Steel Fund).

As mentioned at the beginning of the chapter 2 of this report, the ex-post control stage for the research grant management is, for an important part, centralised in RTD, in a Common Audit Service (CAS). Therefore, the activity exposed here have to be read as

related to the whole research family.

Corporate approach for more efficiency and less burden

In order to limit the audit burden on the beneficiaries and to ensure a consistent audit approach through the Commission services,

- the Common Audit Service undertook in 2015 audits for the DGs that fund research grants (DG CNECT, DG ENTR (now DG GROW), DG MOVE and DG ENER)⁷⁸;
- when relevant, carries out joint audits with the Court of Auditors.

As a consequence, overall 3416 different participations have been audited in 1550 audits carried out since the start of FP7.

For Horizon 2020 the CAS will undertake all audits, including for Executive Agencies and Joint Undertakings. It is a major step forward in ensuring a harmonised approach and also in ensuring that audit burden on beneficiaries is minimised.

Controls and methodology

Since 2007, the Research Directorates-General and the Executive Agencies have adopted a common audit strategy intended to ensure the legality and regularity of expenditure on a multi-annual basis, including detection and correction of systematic errors. The audits examine only interim and final claims by beneficiaries. Transactions relating to pre-financing are not included in the population subject to audit.

In 2015, the Common Audit Service conducted audits for the Common Representative Audit Sample and others initiated on a risk based approach.⁷⁹

Controls results

Ex-post audits carried out in 2015

Regarding DG RTD participations in FP7 grant agreements, 256 audit reports under CAS and 15 DG 'RTD legacy' audit reports were issued in 2015. In addition 3 fusion audits have been also closed, reaching a total of 274 audit results for 2015.⁸⁰

FP7 audit coverage (cumulative figures)

1 550 audits closed by DG RTD
1 404 audited FP7 beneficiaries (by DG RTD)
8.1 % of the RTD beneficiaries in FP7 audited
58.8% of the FP7 budget covered (DG RTD)
(8.4% direct coverage and 50.4% by extrapolation)

Closer examination shows a relative increase of ECA audits and fraud related audits in 2015, as compared to the FP7 years before. The increase of OLAF audits closed in 2015 results from the peak of OLAF audits launched in 2013 (16 audits) and in 2014 (11 audits).

⁷⁸ FP7 audits started in these DGs will be completed by the same DGs. Executive Agencies remain responsible for their FP7 audits. Full details can be found in the AARs of these other services.

⁷⁹ More details on the methodology can be found in the control effectiveness section (2.2.2).

⁸⁰ The Common Audit Service performed audits on other implementing bodies' participations too, which makes a total of 380 audits closed in 2015. This result will be used for cost-effectiveness calculations.

Cumulative audit coverage of FP7

Since the beginning of the FP7, closed audits on DG RTD cost statements represent a *direct* coverage of 8.4% of all FORMs C received. The *indirect* coverage – taking into account the effect of extensions of audit findings – reaches 58.8% of the RTD FORMs C received.

Implementation of FP7 audit results

It should be noted that there will always be a timelag between the start of the project, the payments, audits performed and recoveries made. Research projects are multi-annual and involve payments at different stages. Substantive payments (not prefinancing) only start around 2 years after the beginning of the project. Audits cannot start until substantive spending is made. When an overpayment is identified it may sometimes be recovered immediately through a recovery order, but it is more common that it is recovered by offsetting against another future payment, especially when projects are still ongoing. As payments are usually made at 18-24 month intervals, there will often be a considerable time lag between the identification of a recovery and the effective recovery. Given the pattern of payments, and the type of beneficiaries, this does not generally present a particular risk to the EU financial interests. However, it is one of the major reasons why there are many outstanding recoveries.

By the end of 2015, and in a cumulative way from the beginning of the programme FP7, adjustments were proposed for 1 573 audited DG RTD participations. By the end of 2015 the amount to be recovered was EUR 49.4 million, of which more than EUR 31.5 million (63.8%) has been effectively recovered (this includes liquidated damages).

Table 8 - Implementation of FP6 and FP7 audit results in DG RTD (cumulatively)

Cumulatively	Results from external audits		Adjustments pending implementation		Adjustments temporarily suspended		Adjustments implemented	
	Number of participations R=S+T	Funding adjustments set by AOSDs A=B+C	Number (S)	Value (B)	Number (S)	Value (B)	Number (T)	Value (C)
FP6	1908	€ 58.365.099	18	€ 3.280.642	8	€ 287.421	1882	€ 54.797.036
FP7	1573	€ 49.356.416	292	€ 16.100.579	25	€ 1.715.374	1255	€ 31.540.463

For 2015 alone, EUR 10.8 million was recovered for FP7 (including liquidated damages). In addition, EUR 3.9 million was recovered relating to the implementation of FP6 audit results. There are currently 343 FP6 and FP7 cases pending implementation for a total value of EUR 21.38 million.⁸¹

Implementation of extrapolation

The extrapolation process allows correcting systemic errors of a beneficiary detected by an audit in all his ongoing participations. When the audit results mention systemic errors, all the contracts of the beneficiary are analysed, and for those where these systemic errors affect the expenditure, adjustments are made. It has to be noted that this process often takes place after the audit is closed, which means 3-4 years after the final payment of the grant.

Regarding FP6, the implementation rate for extrapolation by the end of December 2015 was at 93.9% (92.8% in 2014) for DG RTD.

As regards the FP7 programme, in 2688 extrapolations were implemented for 4000 DG RTD participations with possible systemic errors. The implementation rate for

⁸¹ Source: ASUR application.

extrapolation by the end of December 2015 was 67.2% for FP7. This is an expected implementation rate at this stage.

Table 9 - Implementation of FP6 and FP7 extrapolation in DG RTD (cumulatively)

Cumulatively	Number of Contracts analysed for extrapolation A=(B)+(C)+(D)+(E)	Implemented cases (B + C + D)					Number of cases to be implemented (E)	
		Without systemic errors	With systemic errors					
			In favour of the COMMISSION		In favour of the BENEFICIARY			
			Number (B)	Number (S)	Amount €	Number (S)		Amount €
FP6	7621	3589	3561	€ 33.672.724,00	230	€ 1.847.539,00	241	
FP7	4000	1806	780	€ 11.561.023,00	102	€ 657.586,00	1312	

Taking Tables 8 and 9 together shows that, to date, EUR 131.6 million has been recovered following audits of FP6 and FP7.

Coal and Steel Research Fund

The Coal and Steel Research Fund is managed under the provisions of the Council Decision (2008/376/EC) since 2008. Most of the beneficiaries are also participating to FP7/H2020 projects. The number of the projects is very low compared to the FPs: a total of 625 for the period 2009-2015.

Payments under the Coal and Steel Research Fund in 2015 amounted to around EUR 45.24 million, being 1.2% of total DG RTD expenditure.

The 242 running projects represent a total amount of EC contribution of EUR 217.7 million.

37 audits have been completed since 2008, representing 107 participations and a total audited amount of EUR 33.2 million of EC financial contribution.

Expenditure under indirect management

This section reports and assesses the elements that support the assurance on the achievement of the internal control objectives as regards the results of the DG's supervisory controls on the budget implementation tasks carried out by other Commission DGs and entrusted entities distinct from the Commission.

As mentioned under 2.1.3, DG RTD has entrusted 29.4% of its 2015 budget (payments) for implementation to other Commission services, Executive Agencies⁸², Joint Undertakings, other bodies linked to Article 185 initiatives, and to the EIB.

⁸² The EAs receive delegation directly from the Commission, the Executive Director of an EA is the AOD, who has to provide assurance on the operational expenditure of the EA in his/her AAR. As far as the administrative/operating budget is concerned, the Director of the Executive Agency is the Authorising Officer and has the entire responsibility of the subsidies received from the European Commission. The parents DG(s) has(have) the responsibility on the subsidies given to EAs. Hence, those subsidies are part of the Commission expenditure on which the AOD of the parent DG must provide assurance in his/her DG AAR.

Executive agencies

Agencies

In 2015, DG RTD was the lead DG for the Executive Agencies REA and ERCEA. In Horizon 2020 some parts of the programme are implemented by the European Agency for Small and Medium-sized Enterprises (EASME) and the Innovation and Networks Executive Agency (INEA). RTD is a parent DG of these two agencies, although not the lead DG.

REA and ERCEA implemented a total of EUR 1 940.53 million payment appropriations on the budget lines 08 (RTD)⁸³. EASME and INEA implemented in 2015 EUR 480.45 million payment appropriations on the same line.

DG RTD paid to REA and ERCEA a total amount of EUR 93.13 million of administrative subsidies. The EAs have justified its use and any unused appropriations have been recovered by the parent DG.

Supervision arrangements

The appropriate monitoring and supervision of the EAs activities are mainly achieved by means of participation of the parent DG(s) in the Steering Committee of the EAs. The Agency's Director ensures that the members and observers of the Steering Committee receive all relevant information and reliable control results needed for the appropriate fulfilment of their mandates.

The annual planning and reporting cycle forms the basis of the monitoring and supervision of the Agencies' activities by the Steering Committee. In particular, the Annual Work Programme contains an obligation of assessment of risks and risk exposure, and provides a number of key performance indicators. These constitute the benchmark against which the performance of the EAs is monitored through its interim reporting and AAR. It is complemented by other relevant sources of information such as the reports from the Discharge Authority, ECA, IAS and OLAF.

Moreover, part of the management staff of these Executive Agencies is staff from DG RTD on secondment.

Control results

The supervision of the Executive Agencies continued throughout 2015. The preparation of the AARs of these Agencies was coordinated and reviewed by DG RTD and the Steering Committees of the Agencies. No unexpected issues arose that would need to be raised in this report. The reserves of the REA on a part of its expenditure mirror what is already reflected in this report and are well known to DG RTD.

Joint Undertakings

The Joint Undertakings IMI2, FCH2, Clean Sky2 and BBI implement parts of FP7 and Horizon 2020, under the supervision of DG RTD.

They received from DG RTD in 2015 payments for operational and running costs for a total amount of EUR 479.93 million. Further details can be found in the Annex 6 of this report.

Supervision arrangements

The monitoring, supervisory and accountability arrangements include the following:

⁸³ Not a direct part of the DG RTD budget and so not covered directly by the assurance in this report.

- The Commission is a member of the Governing Board. Arrangements are in place within the DG to ensure that all proposals to the Governing Board are properly assessed and the Commission position agreed;
- Each Joint Undertaking is required to produce an AAR;
- The Joint Undertaking's Director signs a declaration of assurance in line with the one used in the Commission;
- The Joint Undertaking is required to inform the Commission without delay of any significant developments in the areas of risk management, control and audit;
- The Joint Undertakings have harmonised their ex-post audit strategies with the Commission; DG RTD is aware of the results of the ex-post audits carried out;
- DG RTD may request any additional information deemed necessary and has the right to audit the JTI Joint Undertakings' operations;
- The Commission's IAS may carry out audits in the JTI Joint Undertakings, and DG RTD will receive the reports for action if necessary;
- The ECA is the external auditor of the JTI Joint Undertakings, and DG RTD receives copies of the reports for action if necessary;
- There are extensive informal and formal contacts regarding research matters, as well as on questions of internal control, audit (the JTIs are members of the Committee on Audit in Research), internal control, etc.

Control results

Neither the draft AARs, nor the regular supervision of these bodies, raised particular issues that would need to be included in this report.

In addition, the Court of Auditors also gave a clear opinion on all the JU's 2014 accounts, without a detected error rate above the materiality threshold.

Article 185 bodies

Article 185 TFEU enables the EU to participate in research programmes undertaken jointly by several Member States, including participation in the structures created for the execution of national programmes.

The actions supported may cover subjects not directly linked to the themes of the FP, as far as they have a sufficient EU added value. They will also be used to enhance the complementarity and synergy between the FP and activities carried out under intergovernmental structures. The Article 185 bodies supported in 2015 are set the following:

- EUROSTARS and EUROSTARS2 (Research for the benefit of SMEs)
- European Metrology Programme (EMRP) and European Metrology Programme for Innovative and Research (EMPIR)
- Joint Baltic Sea Research and Development Programme (BONUS)
- European and Developing Countries Clinical Trial Partnership (EDCTP and EDCTP2)

In 2015, DG RTD paid a total of EUR 90.51 million to Article 185 initiatives. Details on the legal bases and the amounts entrusted can be found in Annex 6 of this report.

Monitoring arrangements

The monitoring and supervisory arrangements include the following:

- The Commission is an observer in the boards;
- There is a delegation agreement between the Commission and the body setting out its obligations;
- The bodies are subject to an ex-ante readiness assessment

- The annual work plans are approved by the Commission
- The Commission receives annual reports from the bodies, including a management declaration and an audit certificate
- The Commission has the right to suspend payments if the reports are considered to be inadequate
- There are interim and ex-post evaluations to ensure that the bodies are achieving their policy objectives.

Control results

In 2015 DG RTD has not identified any particular issues that would need to be addressed in this report.

Financial instruments implemented by EIB/EIF

Innovfin aims to support research and innovation through financial instruments. DG RTD has a duty to ensure proper supervision of the budget used, in accordance with the Financial Regulation and other legal acts and in line with the general principle of Sound Financial Management.

To help ensure that the achievement of operational objectives is based on Sound Financial Management, the principles and details of the supervision of the budget entrusted to the EIB and EIF, and the internal control steps that apply to *Innovfin* have been established in 2015 in accordance with the recommendation of the audit by the Court of Auditors related to RSFF.

It includes a supervision strategy and procedure as well as the key documents relevant to *Innovfin*. It is supplemented by the control strategy that EIB is required to present to us according to the Delegation Agreement. The EIB supervision strategy and control procedure was approved by written procedure after presentation to the 4th meeting of the Debt Steering Committee for Horizon 2020 financial instruments on 12 November 2015. Both sets of documents have been endorsed by the Director General in early 2016.

In accordance with the Delegation Agreement, both entrusted entities (EIB and EIF) submit to the Commission for each financial instrument:

- a management declaration of assurance annexed to the financial statements in the form defined in EIF FAFA;
- a summary report on audits and controls carried out in the period in question, including an analysis of the nature and extent of errors and weaknesses in systems identified if any, as well as any corrective actions taken or planned;
- an independent audit opinion on the management declaration and the summary report on audits and controls.

In 2015 DG RTD has not identified any particular issues that would need to be addressed in this report.

Cost-effectiveness of the controls

Direct grant management

Following the Commission central services' instructions, the cost effectiveness of the controls in direct grant management is assessed by the cost of the different control stages compared to the amounts associated to them (committed, audited, paid amounts). The overall assessment is obtained from the ratio between all those costs and the total amount paid in the year for grants.

Stage one: Programming and evaluation

The costs of this stage for DG RTD are estimated as

- EUR 11.93 million internal costs (staff);
- EUR 5.44 million external costs (evaluation experts);

being a total amount of EUR 17.37 million, to be compared to the EUR 1 967.8 million EC contribution granted for H2020 projects in 2015.

Stage two: Grant preparation (contracting)

The costs of this stage are estimated to EUR 9.01 million, to be compared to EUR 1 967.8 million of EC contribution granted for the H2020 projects in 2015 in 342 projects.

Stage three: Monitoring the projects' implementation

The costs of this stage are estimated to EUR 22.04 million, to be compared to EUR 2 502.63 million paid to the grant beneficiaries for FP7 and Horizon 2020 [?].

Stage four: Ex-post controls and recoveries

Unlike the other stages of the grant management control system, the scope of the audit stage is wider than just DG RTD. The Common Audit Service is hosted by DG RTD, but it is responsible, in FP7, for audits for all DGs of the Research Family, and for all audits (including Executive Agencies and Joint Undertakings) in H2020.

This means that more costs of the audit process are borne by DG RTD than by other DGs in the Research Family.

Out of the 380⁸⁴ audits closed in 2015 (CAS audits and "RTD legacy"), 289 were carried out by external audit firms, and 91 by in-house auditors. Audits carried out by external audit firms were followed up by the in-house monitoring team from the receipt of the report to their closure.

The total cost of the audit function in DG RTD is estimated to EUR 8.54 million, a result of the addition of

- EUR 5.11 million internal costs
- and EUR 3.43 million external costs

The average cost of an audit is estimated at EUR 22 483.67 per audit.

Table 10 provides an overview of the evolution of human and financial resources used in DG RTD for ex-post audits. It shows the impact of the increasing responsibilities of the Common Audit Service, within the research FPs' implementation.

Table 10 - Resources used in DG RTD for ex-post audits

	2013	2014	2015
Internal resources for ex-post audits	33.1 FTE	35.96 FTE	42.67 FTE
Cost of externalised auditing (in EUR)	3 105 881	3 202 100	3 429 127

The costs related to the implementation of the audit results and the extrapolation are not identifiable as such: they are included in the costs of project monitoring.

⁸⁴ All audits included, for DG RTD and other FP7 implementing bodies' participations.

Overall assessment of the cost effectiveness in direct grant management

Table 11 - Overall cost effectiveness indicator for direct grant management

Direct grant management	Costs			Associated output (amounts, M€)				
Control stages	internal costs (M€)	external costs (M€)	Total per stage (€)	Total EC contribution granted	Total EC contribution granted	Total amount of payments	Total audited amount	% per stage
Stage 1 Evaluation /selection	11,93	5,44	17,37	1 967,80				0,88%
Stage 2 Grant finalization	9,01	0,00	9,01		1 967,80			0,46%
Stage 3 Contract monitoring	22,04	0,00	22,04			2 502,63		0,88%
Stage 4 Ex post audit	5,11	3,43	8,54				1 039,86	0,82%
Total direct grant management	48,09	8,87	56,96	Overall rate (total costs/total amount paid)				2,28%

According to Table 11, the overall cost of the controls in grant management represents 2.28% of the total implemented budget in 2015.

The figures must nevertheless be read with some caution:

- **negative bias of the overall rate for DG RTD:** the internal costs of DG RTD reported here are not necessarily comparable to the amount of financial transactions authorised by DG RTD, as for some stages DG RTD takes a role for the whole research family (programming, communication – included in the first stage; audit function). For this reason, the value of the overall indicator is higher for DG RTD than it could be without its horizontal functions.
- **inconsistent scope:** some stages are related to H2020 and others to FP7; this decrease the relevance of the general cost-effectiveness calculations and jeopardize the comparison with the previous year's results;

It must be also noted that the *benefits* of the grant management control system cannot be expressed by the only implemented budgetary amounts.

The first objective of the control system is to achieve the main policy objective – to create growth and jobs, especially by contributing to more and better science in Europe. In this sense, the controls aim to ensure good work programmes, select the best proposals to be funded and verify the scientific deliverables. Thus, the benefits are much wider than the budget implemented in the given year.

The second objective of the control system is to ensure that the EC contribution paid to the beneficiaries is complying with internal control objectives. This means, in short, legal and regular transactions done in a cost-effective way. This report develops at several points how the balance between these two requirements is found.

Overall, given:

- the achievements of research policy as set out in Part 1;
- the quantitative and qualitative benefits arising from the control systems adopted;
- the error rates set out above, which are at a level considered as being an appropriate balance between different policy objectives and between trust and control;
- the costs of the control system compared to the level of expenditure;

It is considered that a cost-effective control system has been put in place, balanced with the objectives of research and innovation policy.

Indirect grant management

Executive Agencies

In DG RTD, it is estimated that 9.4 FTE were employed in supervision and coordination activities related to these bodies. This relates to a total cost of around EUR 1.26 million,

or 1.35% of the amount of the total expenditure sub-delegated by DG RTD to them (only administrative subsidies).

It should be noted that the supervision of executive agencies also includes the implementation of their operational budget, which they receive directly from the College, without passing by DG RTD. Actually, REA and ERCEA implemented a total of EUR 1 940.53 million of payment appropriations on the budget lines 08 (RTD)⁸⁵. EASME and INEA implemented in 2015 EUR 480.45 million payment appropriations on the same line.

The amounts should also be considered when it comes to the cost-effectiveness of the supervision.

Joint undertakings

Total costs of supervision of the Joint Undertakings incurred in 2015 by DG RTD are estimated at EUR 1.67 million, 0.35% of the EUR 479.93 million paid to these bodies.

Article 185 bodies

The costs of their supervision are estimated to EUR 0.70 million, or 0.78% of the payments made in 2015. DG RTD considers that its management and supervision is effective and cost-effective.

Overall assessment of the cost effectiveness in indirect grant management

Table 12 – Supervision costs of indirect management

Indirect Grant Management	Payments	FTE	Total costs	%/total costs
Executive Agencies	93 133 470.80	9.40	1 259 600.00	1.35%
Article 185 bodies	90 511 520.58	5.24	702 160.00	0.78%
Joint Undertakings	479 933 297.02	12.47	1 671 569.60	0.35%
Total	663 578 288.4	27.11	3 633 329.60	0.55%

Overall, it is considered that a cost-effective control system for indirect grant management has been put in place.

Indirect management of the financial instruments

DG RTD payments to EIB and EIF amount in 2015 to a total of EUR 408.18 million.

Administrative and policy-related incentive fees was deducted by the implementing institutions from the EC contribution paid: a total of EUR 31.77 million:

- EIB has drawn in 2015 from the EU account an amount of EUR 8 524 000 for administrative fees, EUR 2 968 000 for Policy-related incentive Fees and EUR 58 076.95 for treasury asset management fees and unforeseen expenditures. The cumulative amount of fees drawn by the EIB as of 31/12/2015 reaches EUR 16 550 076.95.
- EIF has drawn in 2015 from the EU SMEG account an amount of EUR 721 218 for administrative fees and EUR 7 997 440 for Policy-related incentive Fees. The

⁸⁵ Not a direct part of the DG RTD budget and so not covered directly by the assurance in this report.

cumulative amount of fees related to InnovFin SMEG drawn by the EIF as of 31/12/2015 reaches EUR 12 718 658.

- EIF has drawn in 2015 from the EU IFE account an amount of EUR 2 500 000 for administrative fees upon signature on 15/06/2015 of the Annex of the Delegation Agreement related to InnovFin SME VC (IFE).

The share of fees in the 2015 payments is 7.78%. However, the fees were drawn from the EU account according to the Delegation agreements' terms, which were designed to allow the funds' sound management. The latter requires that some fees are paid in advance, at the beginning of the programmes.

In order to have a reliable picture on the share of the management fees in the total implemented amounts, the calculation must be done at the closure of the programme.

In addition, the supervision of these bodies was carried out in 2015 by 3.44 FTE staff, representing a total cost of EUR 0.46 million. Compared to the entrusted budget in 2015, it gives a ratio of 0.11%.

As a conclusion, the financial instruments are managed in accordance with the Delegation agreements concluded with the EIB and the EIF, and are considered at this stage as compliant with the cost-effectiveness related internal control objectives.

2.1.2 Control effectiveness as regards legality and regularity

At point 2.1.3 of this report it was explained that DG RTD's budget is implemented under two main control systems, namely *direct and indirect grant management*. Innovfin financial instruments represent the second most important control system, and the rest less than 2% altogether.

Consequently, this section will give explanations related to the main expenditure items.

Grant management control results (direct and indirect)

The general control objective for the Research services, following the standard quantitative materiality threshold proposed in the Standing Instructions, is to ensure for each FP (and the Research Fund for Coal and Steel in DG RTD), that the residual error rate, i.e. the level of errors which remain undetected and uncorrected, does not exceed 2% by the end of each FP's management cycle.

The question of being on track towards this objective is to be (re)assessed annually, in view of the results of the implementation of the ex-post audit strategy and taking into account both the frequency and importance of the errors found as well as a cost-benefit analysis of the effort needed to detect and correct them.

For FP7, the Common Audit Strategy and its results cover the DG's and the Executive Agencies. Joint Undertakings and Article 185 bodies report to DG RTD about their own audit results.

Control results of the Common Audit Sample for FP7

The main legality and regularity indicator is the error rate detected by ex-post audits. Because of its multi-annual nature, the effectiveness of the control strategy of the Research Directorates-General can only be fully measured and assessed in the final stages of the FP, once the ex-post control strategy has been fully implemented and systematic errors have been detected and corrected.

Ex-post audit methodology

The Common Representative audit Sample (CRaS) is intended to estimate the overall level of error in FP7, across all services involved in its management. It covers cooperative grants (given to consortia with participants from different Member States) as well as those granted under different schemes – IDEAS (ERCEA), Marie Skłodowska-Curie (REA), infrastructure, etc. These are referred to as "representative" audits. All of these grants follow the same homogeneous control system set out in this report. However, they may have differences in the details of the schemes and eligibility criteria which may, after taking into account all the available evidence, lead to different conclusions on the overall error rate.

The CRaS is complemented by 'risk-based' audits; audits selected according to one or more risk criteria. These audits are intended to detect and correct as many errors as possible and to identify possibly fraudulent operators. These audits are referred to as 'corrective' audits.

Up to mid-2012, there was also a considerable emphasis on 'preventive' audits, i.e. early audits on beneficiaries participating in many projects and which had not been audited before. This initiative was taken with the intention of 'cleaning' the budget, and with a more general aim of bringing the residual rate of error in FP7, after taking recoveries and corrections into account, to below 2%.

Different indicators are calculated to provide a comprehensive view of legality and regularity:

Overall Detected Error Rate: This is the error rate derived from the results of all audits, whether audits on a representative sample of beneficiaries or audits implemented for other reasons (large beneficiaries, preventive audits, risk factors, etc).

Representative Error Rate: This is the error rate derived solely from the results of audits on a representative sample of beneficiaries, extrapolated by a statistical method to the overall population. This error rate provides an estimate of the level of error in FP7 at the time of the audits, but says nothing about the follow-up and corrections/recoveries undertaken by Commission services after the audit, nor of the net final financial impact of errors. This error rate is calculated for FP7 as a whole.

Residual Error Rate: The 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. The calculation of the residual error rate, as shown in **Annex 4**, is based on the following assumptions:

- (1) all errors detected will be corrected;
- (2) the residual error rate for participations subject to extrapolation is estimated to be equal to the non-systematic error rate; and
- (3) all participations subject to extrapolation are clean from systematic material errors.

The residual error rate develops over time and depends on the assumptions set out above. DG RTD would like to underline that this indicator is reliable and acceptable for the purposes for which it was intended, i.e. as a legality and regularity indicator on the progress made, through its ex-post strategy, in dealing with errors over a multi-annual basis. However, it remains an estimate given that not all extrapolation cases have been fully implemented yet.

Results of the ex-post audits

The error rates resulting from DG RTD FP7 audit work are:

- **Overall Detected Error Rate:** Based on 3 336 audit results, this error rate amounts to **4.35%**⁸⁶.
- **Common Representative Error Rate:** Based on 298 cost statements for which the audit is completed (92% out of a sample of 324), this error rate is **4.47%**. The remaining cases are still subject to contradictory procedures with the beneficiaries; consequently, the Common Representative Error Rate may still develop. Based on the expected results of audits that are not yet closed it is estimated that this error rate will finish at around 5%. The Common Representative Error Rate is in a similar range to the one referred to in the Financial Statement accompanying the Horizon 2020 proposals.
- **Residual Error Rate:** At this point in time, this error rate amounts to **2.88%**. This rate may increase slightly following the development of the Common Representative Error Rate.

These results are concordant with the general expectation that the Common Representative Error Rate resulting from audits of FP7 will be around 5% at the end of the programme. The residual error rate for DG Research and Innovation is expected at a maximum of 3%.

These amounts do not necessarily mean that there is a loss to the Community budget. Many of the projects spend more than the capped budget, and so the real loss to the Community budget will be lower than the financial impact if the error rates above.

Comments on the control results

DG Research and Innovation will continue its actions to prevent some causes of errors in FP7 expenditure, however it seems clear that the maximum 2% residual error target for FP7 will not be attained without a massive increase in the number of audits, or a considerable increase in the administrative burden imposed on participants through widespread ex-ante controls.

Therefore, although the Residual Error Rate remains above the target of 2%, account should be taken of the cost of achieving this target. As was stated in the Financial Statement accompanying the Horizon 2020 legislation, attempts in the past to achieve the 2% target caused a number of unexpected and/or undesirable side-effects. Among beneficiaries and the legislative authorities, the feeling became strong that the control burden has become excessive. This increases the risk of lowering the attractiveness of the Union's Research programme, thereby negatively affecting Union research and innovation.

There is, however, an acceptance among stakeholders and institutions that an approach solely focussed on the achievement of a 2% target for legality and regularity may not be appropriate.⁸⁷ There are other objectives and interests, especially the success of the Union's research policy, international competitiveness, and scientific excellence, which should also be considered. At the same time, there is a clear need to manage the budget in an efficient and effective manner, and to prevent fraud and waste.

Taking these elements in balance, and in the light of the results of the FP7 audit campaign, DG RTD considers that its overall control strategy ensures that trust, control and other policy objectives are kept in balance. Aiming to achieve a residual error rate of 2% at all costs is not a viable approach.

⁸⁶ This is lower than the representative rate as it includes a number of preventive audits carried out at the beginning of FP7.

⁸⁷ This point has been widely discussed in the 2014 annual report.

For this reason, Article 23 of the Horizon 2020 Regulation explicitly states that:

"The control system shall ensure an appropriate balance between trust and control, taking into account administrative and other costs of controls at all levels, so that the objectives of Horizon 2020 can be achieved and the most excellent researchers and the most innovative enterprises can be attracted to it".

It also states that audits of expenditure on indirect actions shall be carried out in a coherent manner *"to minimize the audit burden for participants"*.

The reserve in the declaration of assurance for the FP7 expenditure is addressed in Section 2.5.

Specific control measures contributing to the legality and the regularity of the transactions

Legal provisions won't anymore be reviewed for the ongoing FP7 projects. Therefore, the efforts in order to avoid errors have to be done at the level of the monitoring of the projects, of the ex-ante controls before payments. The implementation of the ex-post control results also has a cleaning effect on the paid amounts, together with the correction of systemic errors.

The communication campaign on the most common errors toward beneficiaries has been completed in 2015 by an internal not and a specific training session for DG RTD's staff. The reminders sent to the beneficiaries before reporting deadlines have been revised and completed in the same sense.

Certificates on the financial statement (CFS) continue to be required for every cost claim over EUR 375 000. Although given by a qualified auditor or a Certified Public Official, DG RTD, as well as the ECA, have identified that these certificates do not always identify all ineligible expenditure in the cost claim. However, a study showed that cost claims with a CFS had an average error rate 50% lower than those without one. The services responsible for Research continue to provide guidance to beneficiaries and certifying auditors.

So as to reinforce the cleaning effect of the ex-post controls, a third Common Representative Audit Sample will be launched in 2016.

Control results regarding the FP7 expenditure outside the Common Audit Sample

Joint Undertakings and Article 185 bodies report to DG RTD about the legality and regularity of their transactions.

For 2015, none of the Joint Undertakings reported a residual error rate estimated to be above the materiality threshold. The ECA concluded, for the 2014 expenditure of these bodies, that it had reasonable assurance about the legality and regularity of the underlying transactions. Therefore the budget entrusted to JU's will not be in the scope of the FP7 reservation. The reserve of RTD previously included the expenditure of the IMI Joint Undertaking, this is not the case this year.

The supervision of the Article 185 bodies did not raise any element that could have a material impact on the assurance given in this report. These elements of expenditure will not be in the scope of the FP7 reservation.

Control results for H2020

Ex-post control strategy

The steering Committee of the CSC adopted the Common Audit strategy for Horizon 2020 programme.

Ex-post control results

The first projects having been granted in 2014, the first payments against cost claims are expected for 2016. Therefore no sample based audit was carried out for Horizon 2020 in 2015, so there is not yet any representative control result to be reported this year.

Expectations

In the Financial Statement accompanying the proposal for Horizon 2020, the Commission set out its analysis of the likely future trend of error rates. It stated that the simplifications introduced in Horizon 2020 could be expected to lower the representative error rate from 5% to 3.5%, with the Residual Error Rate being as close as possible to 2% (but without necessarily being below 2%). This analysis still holds true, as the simplifications proposed were generally accepted.

However, some elements have been introduced in the legislation that will increase the risks in the programme. Firstly, there is the target for an increased participation of Small and Medium- Sized Enterprises (SMEs). As was noted in the 2012 AAR, SMEs have an error rate more than twice the rate for non-SMEs (6.61% as opposed to 3.07%). This is not entirely surprising, but the involvement of SMEs is vital to increasing innovation and boosting jobs in the EU. However, it does mean that an increased participation of SMEs increases risk.

Secondly, Horizon 2020 includes a commitment to involving new participants in the Programme. However, as shown in 2012, new participants have an error rate nearly three times as high as recurrent participants (8.32% as opposed to 2.94%). New participants, though a positive element for the European research landscape, increase risk.

Furthermore, during the discussions on the legislative package for Horizon 2020, provision was made for support to participants with large research infrastructures. This provision should support some of the major European research organisations, who might otherwise have had difficulty funding their advanced research infrastructure, but does insert an additional complication into the rules, and with it an increased risk. The wider possibility to include additional remuneration as an eligible cost brings an increased level of risk of error.

The Commission will take actions to try to mitigate the risk arising from these four new elements (guidance, training, ex-ante assessments for large infrastructures, additional remuneration) but these will only mitigate, not avoid, the risks.

Overall, DG RTD still 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.

Control results for Research Fund for Coal and Steel

The Research Fund for Coal and Steel is managed under the provisions of the Council Decision (2008/376/EC) since 2008. The rules for participation are close to those applied for Research Framework Programmes, but not exactly the same. Most of the beneficiaries are also participating to FP7/H2020 projects. The number of the projects is very low

compared to the FPs: a total of 625 for the period 2009-2015.

Control strategy

The control strategy for the current projects is based on strong ex-ante controls and ex-post audits at a rhythm of 5 audits per year. The sample is established in order to have a maximum coverage and also to avoid repeated audits at the same beneficiary's within a 5 years period.

Because of the low number of projects, the audit sample is not designed to produce a result that is statistically representative of the population. Nevertheless, the coverage means that the errors detected give a reasonable estimate of the overall error rate.

Corrections are implemented following the audit results, and systematic errors are corrected by extrapolation.

Control results

So far 37 audits (107 participations) have been undertaken, covering 9.7% of total expenditure.

In 2015, 10 audits were closed, with an important impact on the cumulative error rate. As a result of all the audits completed so far, the detected error rate is 4.62%. However, this error rate arises largely from one large error, where 87.01% of the expenditure was found to be ineligible. Without this case the error rate could be estimated at 3.54%.

Recoveries and corrections that have followed will lead to a lower residual error rate, estimated at around 3%.

Conclusions

Overall, DG RTD considers that expenditure under the Research Fund for Coal and Steel was marked in 2015 by a material level of error. A reservation will be issued consequently.

In order to be close to the current FP's rules, and lower the future errors, a new model grant agreement was validated by the Commission in August 2015⁸⁸. The control strategy will be adapted consequently, if relevant.

Control results for indirect expenditure (other than grants)

For the 2015 reporting year, the cross-delegated AORs have signalled no serious control issues.

Regarding the implementing bodies for the financial instruments INNOVFIN, their annual report for 2015 is being analysed.

From our own monitoring work done, which includes regular contacts/representation and/or the desk reviews of relevant management reports and audit reports, we have no indications that their reporting would not be reliable.

Overall assessment of the legality and regularity of operations under RTD expenditure

DG RTD has set up internal control processes aimed to ensure the adequate

⁸⁸ C(2015) 5757 final COMMISSION DECISION of 26.8.2015 on the multi-beneficiary model grant agreement for the Research Programme of the Research Fund for Coal and Steel.

management of the risks relating to the legality and regularity of the underlying transactions, taking into account the multiannual character of programmes as well as the nature of the payments concerned.

Overall control results

Table 13 - Legality and regularity of the transactions authorized in 2015 in DG RTD

CREDIT TYPE Ctrl system Legal base	Total amount paid in 2015 (M€)	Detected Error Rate Low estimate	Detected Error Rate High estimate	Amount at risk (M€) Low estimate	Amount at risk (M€) High estimate	Estimated corrective capacity
ADMIN						
Admin						
H-2020	2.351.199,16	0,00%	2,00%	-	47.023,98	
Cross-subdelegations						
H-2020	149.551.832,83	0,00%	2,00%	-	2.991.036,66	
RFCS	204.447,52	0,00%	2,00%	-	4.088,95	
Procurement						
H-2020	25.912.668,60					
RFCS	70.516,50					
Subsidies						
H-2020	96.131.931,94	0,00%	2,00%	-	1.922.638,64	
OPERATIONNEL						
Cross-subdelegations						
H-2020	7.583.636,18	0,00%	2,00%	-	151.672,72	
VII	12.960.711,00	4,47%	4,47%	579.343,78	579.343,78	
Experts contracts						
H-2020	3.517.883,27	0,00%	2,00%	-	70.357,67	
VII	311.903,89	0,00%	2,00%	-	6.238,08	
RFCS	502.179,43	0,00%	2,00%	-	10.043,59	
Financial instruments						
H-2020	408.181.780,77	0,00%	0,00%	-	-	
Grants						
H-2020	977.899.218,41	0,00%	0,00%	-	-	
VII	1.459.462.433,65	4,47%	4,47%	65.237.970,78	65.237.970,78	
Previous FP's	3.941.643,48	2,45%	2,45%	96.570,27	96.570,27	
RFCS	44.667.302,43	4,62%	4,62%	2.063.629,37	2.063.629,37	
Procurement						
H-2020	17.163.389,89	0,00%	2,00%	-	343.267,80	
VII	29.745.637,29	0,00%	2,00%	-	594.912,75	
Previous FP's	2.734.545,94					
RFCS	-62.272,72	0,00%	2,00%	-	-1.245,45	
Subsidies						
H-2020	277.932.592,68	0,00%	0,00%	-	-	
VII	285.240.800,00	0,00%	2,00%	-	5.704.816,00	
Previous FP's	4.272.855,58	2,45%	2,45%	104.684,96	104.684,96	
Total	3.810.278.837,72			68.082.199,17	79.927.050,54	46.104.373,94
%				1,79%	2,10%	1,21%

Table 13 shows that at least 97.9% of the expenditure implemented in DG RTD in 2015⁸⁹ is considered as complying with all the legality and regularity requirements. The remaining 2.1% maximum is the part of the expenditure impacted by the risk that the underlying transactions were not compliant with the legal or contractual provisions.

As a consequence, Coal and Steel and the directly managed part of FP7 programmes will be subject to a reservation, because the estimated error rate of these items is beyond the materiality threshold of 2%. Further details follow under point 2.5 of this report.

⁸⁹ The total amount of payments authorized that appears in the above table shows a slight difference with the Annex 3 of this report (in the the latter, payments amount to 3 811 M€, which is 0.03% higher). This report having been finalized before the stabilization of the Annex 3 figures, a perfect consistency is not technically reachable.

In the context of the protection of the EU budget, at the Commission's corporate level, the DGs' estimated overall amounts at risk and their estimated future corrections are consolidated.

For DG RTD, the estimated overall amount at risk⁹⁰ for the 2015 payments made is in a range of 68.08-79.93 M€. This is the AOD's best, conservative estimation of the amount of expenditure authorised during the year not in conformity with the applicable contractual and regulatory provisions at the time the payment is made.

This expenditure will be subsequently subject to ex-post controls and a sizeable proportion of the underlying error will be detected and corrected in successive years. The conservatively estimated future corrections⁹¹ for those 2015 payments made are 46.16 M€. This is the amount of errors that the DG conservatively estimates to identify and correct from controls that it will implement in successive years.

2.1.3 Fraud prevention and detection

DG RTD has developed and implemented its own anti-fraud strategy since 2011, updated in 2013. In 2012, the first Research Family specific Anti-Fraud strategy was signed by the stakeholders. It was updated in 2015.

Strategies and Action plans

As required by the Commission's overall anti-fraud strategy⁹², DG RTD has developed its anti-fraud strategy and completed it by a sectorial strategy in 2012. The related Action plan was completed by the end of 2013.

An updated Common Anti-Fraud Strategy in the Research Family was agreed by the CSC Steering Committee on 18 March 2015.

This is the first time that an Action plan is associated to the sectorial strategy, to be implemented by the members of the Research Family. It will continue to improve fraud risk awareness through communication activities and training for operational staff, by linking databases and information with other Research DGs and Services for intelligence analysis, and through risk-based audit preparation and selection.

Some actions are particularly based on common effort with the members of the Family:

- the awareness-raising anti-fraud course is now run with a common material;
- and three workshops were launched in 2015 in order to elaborate common guidance on fraud prevention and detection.

The Research Family members meet several times a year, at the Fraud and Irregularity Committee (FAIR), to discuss common fraud matters and follow the Action plan implementation. According to the minutes of meeting in December 2015, the Common Action Plan is considered as being completed at 67,5%.

⁹⁰ In order to calculate the weighted average error rate (AER) for the total annual expenditure in the reporting year, detected error rates have been used (not the RER).

⁹¹ This estimate is based on past performance, namely on the average recoveries and financial corrections (ARC) implemented since 2009 and applied to the payments of the year.

⁹² COM(2011) 376 24.06.2011.

Control results

The number of fraud cases regarding DG RTD beneficiaries and the FPs that it manages remains low. There is an organised follow-up of fraud cases and fraud suspicions including coordination with OLAF.

In 2015, 13 cases were referred to OLAF (including 3 cases of irregularities detected by unit RTD.J.2 concerning DG CNECT beneficiaries) and 20 cases were initiated by OLAF on the basis of information received from other sources.

DG RTD's fraud awareness training was attended in 2015 by 185 staff from all operational functions, 51 from DG RTD and the 134 from Executive Agencies and Joint Undertakings. A specific session for managers took place in April 2014.

Since the beginning of the course in 2013, a total of 639 (compared to 454 at the end of 2014) staff have been trained.

2.1.4 Other control objectives: safeguarding of assets and information, reliability of reporting

The table 4 of the Annex 3 reports EUR 7.3 billion financial assets.

DG RTD's financial assets are predominantly pre-financings paid to the research grant beneficiaries and to the different entrusted entities implementing parts of Horizon 2020.

They are therefore managed and controlled in the context of

- direct grant management;
- management of financial instruments;
- indirect grant management;

as explained in the above sections.

These amounts are cleared from the prefinancing accounts after the validation of the cost claims or the relevant periodic management reports.

2.2 Audit observations and recommendations

This section reports and assesses the observations, opinions and conclusions reported by auditors in their reports as well as the opinion of the Internal Auditor on the state of control, which could have a material impact on the achievement of the internal control objectives, and therefore on assurance, together with any management measures taken in response to the audit recommendations.

2.2.1 Internal Audit Service (IAS)

IAS's Statement for 2015

In its contribution to the 2015 AAR process⁹³, IAS concludes that

"[...] the internal control systems audited are overall working satisfactorily although a number of very important findings remain to be addressed in line with the agreed action plans [...]"

This statement is based on all work undertaken by the IAS in the period 2013-2015.

In addition, the statement takes into account that:

- *"for the accepted recommendations made by the IAS and the IAC in 2013-2015, management has adopted plans⁹⁴ to implement them which the IAS considers adequate to address the residual risks identified by the auditors,*
- *the implementation of these plans is monitored through reports by management and through follow-up audits by the IAS,*
- *management has assessed a number of action plans not yet followed up by the IAS as implemented, and*
- *management has not rejected any critical and/or very important recommendations."*

The state of play of the implementation of the recommendations

Audit on H2020 Grant Management in DG RTD (finalised on 28/01/2016)

The audit did not result in the identification of any critical or very important issues, the IAS considers however that there is room for further improvement

Audit on the Participant Guarantee Fund for FP7 and H2020 (finalised on 18/12/2015)

The IAS concluded that the processes and controls related to the Participant Guarantee Fund are adequately designed and effectively implemented. In addition, the operational and administrative procedures are cost-effective, which ensures the achievement of the fund's objective to manage the risk of non-recovery of sums due by defaulting beneficiaries.

⁹³ Ares(2016)761574

⁹⁴ The Final Report for the Audit on Set-up of the Internal Control systems for Horizon 2020 was issued on 28/01/2016. The action plan is currently being prepared by DG RTD.

Audit on the Set-up of the Common Support Centre for H2020 (finalised on 30/10/2015)

The IAS reported one Very Important issue on decision making in the CSC governance. According to the current governance, the Steering Board is the sole decision-making body. The frequency of its meetings does not allow an immediate implementation of key decisions even in those cases where agreement is reached at the level of the Executive Committee.

Audit on the set-up of the Common audit Service (CAS) for H2020

The IAS launched the audit on 25/09/2015 but concluded on 10/12/2015 that the design of the ex-post audit strategy for H2020 is still in a very early stage of development and therefore IAS proposed to postpone the audit to the third quarter of 2016.

'Gap Analysis Review of the Legislation regarding Horizon 2020' (concluded on 13/01/2015)

The objective of this audit was to analyse the Horizon 2020 legislation as decided by the co-legislators, compare it to the initial Commission proposal and highlight, for the most important areas, the additional risks the Commission is facing as a result of the co-legislative process. This was the first part of a wider review of the design of controls and preparations for implementing Horizon 2020.

The IAS issued a single recommendation of a general nature, that DG RTD and other DGs and Agencies responsible for the implementation of Horizon 2020 take proper account of the changes listed in the report and adapt their internal processes in order to address the risks identified.

Audit on the design and set-up of the internal control systems for Horizon 2020 in DG RTD (launched in June 2015)

This audit was finalized in February 2016.

2.2.2 Internal Audit Capability (IAC)

Before the IAC was abolished, in February 2015, it finalised the following engagements:

- Audit on Management of Project reports and Dissemination of Research Results.
- Audit on Objectives, Indicators and Monitoring.
- Audit on Processes Related to Closure of FP7 Grants.
- Desk Review on SEP Evaluation.

In all three cases the auditors assessed that the internal control systems in place provide reasonable assurance regarding the achievement of the objectives set up for the processes under review, with the exception of a number of issues that were the object of recommendations to correct them.

After the IAC was abolished, the IAS has taken over its activities. All the recommendations from the IAC have been transferred to the IAS who proceeded with their follow-up. The IAS reports on the state of implementation of these recommendations to the Audit Progress Committee. For the state of implementation of the recommendations see table in the next paragraph.

2.2.3 European Court of Auditors (ECA)

The Court's overall assessment is that the supervisory and control systems for Research and other internal policies were 'partially effective' and that the most likely error rate for

the Chapter is 5.6%.

Table 14 Impact indicators: Impact on the declaration of assurance

	2014	2015
European Court of Auditors: overall assessment of supervisory and control systems	Partially effective	Partially effective

The Court assessed the 2014 AAR and the accompanying declarations of the Director-General for Research and Innovation and concluded that:

"We examined the report for [...] DG RTD and consider that they generally provide a fair assessment of financial management in relation to the regularity of transactions, and the information provided corroborates our findings and conclusions in most respects. For example, the annual activity report of DG RTD [...] contains a reservation with regard to the accuracy of cost claims relating to grants under the Seventh Research Framework Programme."

This year, for the first time, the Court also states that

"If the information available to the Commission, national authorities or independent auditors had been used to correct errors, the estimated level of error for this chapter would have been 2.8 percentage points lower."

As a consequence of the higher error rate, the recommendations are the following:

Recommendation 1: the Commission, national authorities and independent auditors should use all the relevant information available to prevent, or detect and correct errors before reimbursement.

Recommendation 2: based on its experience under the Seventh Research Framework Programme, the Commission should develop an appropriate risk management and control strategy for Horizon 2020, with regard to making proportionate checks of high-risk beneficiaries such as SMEs and new entrants and of costs declared under specific eligibility criteria.

These recommendations have been accepted.

As regards the first issue, DG Research and Innovation has already developed an extensive communication campaign and consequently provided guidance and feedback to participants and certifying bodies. This was done for FP7, and is being done for H2020.

For FP7 issues, the document listing the 10 most common errors was once more addressed to all participants at the beginning of 2015. For DG RTD's staff, additional guidance has been issued on ex ante controls, and a specific training course has been launched.

For H2020, guidance, and clearer templates have been, and are being, prepared. They are published on the Participant Portal. The simplifications proposed in Horizon 2020 will also make the job of the auditors easier.

At the beginning of 2015, the H2020 Communication campaign on legal and financial issues was kicked-off, followed by events in 9 Member States.

During the second semester of 2015, the Common Audit Service, together with the Common Legal Support Service, organised 7 additional one-day events. Over the whole year there were visits to 16 Member States with 2 046 participants. The focus of the campaign was to clearly highlight the novelties of H2020 compared to FP7.

In addition, seven presentations both on FP7 and H2020, attended by 421 participants,

were given in 2015. These ran in parallel to the Communication campaign.

With reference to internal communication towards EC colleagues and in line with the requirements of the 'Internal Control Standards for Effective Management - Standard 8: Processes and Procedures', the CAS updated some pages of the CSC intranet site (GoFund) which is used as a central point of reference for all the implementing bodies.

As regards the second issue, DG Research and Innovation has begun its work to ensure that the control system for Horizon 2020 is appropriate and proportionate, ensuring sound financial management of the budget without entailing excessive administrative burden on beneficiaries. Proper account will be taken of the nature of beneficiaries and specific eligibility criteria introduced in the legislation. This will involve a control strategy that covers both ex-ante and ex-post controls (audits), and uses controls within the system as far as possible.

2.2.4 Follow-up of action plans for audit from previous years (IAS, IAC, and ECA)

The table 15 summarises the state of implementation of the currently open IAS/IAC audits as of 31 December 2015. At the end of the year, DG Research and Innovation had sixteen open recommendations, with six of them overdue.

Table 15 - State of implementation of the currently open IAS/IAC audits

IAS/IAC AUDIT TITLE	Number of recommendations			
	TOTAL	CLOSED	OPEN	OPEN Overdue
F-UP STATISTIC DATA PRODUCTION	1	1	0	0
SYGMA PROJECT MANAG. (PHASE 1)	7	7	0	0
FP7 CONTROL SYSTEMS & SUPERVISION EXTERNAL BODIES	7	5	2	2
IAS audit on the Participant Guarantee Fund for FP7 and H2020	3	0	3	0
Set-up of the Common Support Centre for H2020 in DG RTD	5	0	5	1
Contribution to Joint Undertakings	4	4	0	0
RESEARCH FUND COAL & STEEL	9	9	0	0
F-UP EVALUATION PROCESSES FP7	4	4	0	0
NEGOTIATION GRANTS 2013	9	9	0	0
MANAGEMENT INDEPEND EXPERTS	12	12	0	0
RISK-SHARING FINANCIAL FACILITY	6	6	0	0
GRANTS TO NAMED BENEFICIARIES	6	6	0	0
CONTRACT MANAGEM. & PAYMENT	5	5	0	0
IMPLEMENT. EX-POST AUDIT RESULT	9	9	0	0
MANAGEM. OF PROJECT REPORTS	6	4	2	0
OBJECTIV., INDICAT., MONITORING	10	7	3	2
CLOSURE OF FP7 GRANTS	9	9	0	0
Desk review on SEP evaluation	1	0	1	1
Total IAS/IAC	113	97	16	6

However, appropriate new deadlines have been set for the overdue recommendations (as at December 2015). There are often justifiable reasons for the late implementation of audit recommendations (for example the need for IT development, legislative deadlines,

new priorities...). These cases are monitored and there are no particular issues that need to be brought up.

The findings and recommendations of the ECA are similarly subject to a systematic follow-up. Action plans have been put in place and implemented. The overall findings of the Court with respect to the error rate are supported by the findings of Commission's own controls, and the effect of this is on the Director-General's declaration of assurance is set out in Part 3 below.

After reviewing the follow-up of all recommendations and the risks identified it is concluded that there is no impact on the assurance provided by this report.

2.3 Assessment of the effectiveness of the internal control systems

The Commission has adopted a set of internal control standards, based on international good practice, aimed to ensure the achievement of policy and operational objectives. In addition, as regards financial management, compliance with these standards is a compulsory requirement.

DG RTD has put in place the organisational structure and the internal control systems suited to the achievement of the policy and control objectives, in accordance with the standards and having due regard to the risks associated with the environment in which it operates.

The effectiveness review carried out for 2015 concluded that all Internal Control Standards were effectively implemented in DG RTD. However, the Internal Control Framework is reviewed continuously, and different initiatives will be taken with respect to different Internal Control Standards.

This year's exercise was largely based on the analysis of the reports from the Authorising Officers by Sub-Delegation (AOSD) for 2015 and the 2015 risk assessment exercise at Directorate and Directorate-General level. In the instructions for the preparation of these reports, AOSDs were requested to report on the compliance with the Commission Internal Control Standards as well as to assess its effective functioning regarding the achievement of the internal control objectives.

To complement the effectiveness assessment, the information available from other internal control monitoring tools summarised in the monthly reports on the implementation of recommendations and in the reports on resources, audit and internal control to the Commissioner as well as the registry of exceptions and internal control weaknesses reported during the period and regular reporting to management, was analysed for its impact on effectiveness of internal control system.

On the basis of the outcome of this exercise, DG RTD concludes that the internal control systems in DG Research and Innovation meet their control objectives and are being effectively implemented.

No internal control standard will be prioritised in 2016, but it should be highlighted that important work is ongoing on ICS 5 – Objectives and performance indicators, in order to ensure that the performance framework is complete.

In conclusion, the internal control standards are effectively implemented and functioning. In addition, DG RTD has taken measures to further improve the effectiveness of its internal control systems in the area of the objectives and reporting indicators.

2.4 Conclusions as regards assurance

This section reviews the assessment of the elements reported above (in Sections 2.1, 2.2 and 2.3) and draws conclusions supporting the declaration of assurance and whether it should be qualified with reservations.

Review of the elements supporting assurance

The information reported in Part 2.1-2.2 stems from the results of management and auditor monitoring contained in the reports listed. These reports result from a systematic analysis of the evidence available. This approach provides sufficient guarantees as to the completeness and reliability of the information reported and results in a complete coverage of the budget delegated to the Director-General of DG RTD.

The information reported in Part 2.3 does not result in any major issues meriting a reservation.

Overall Conclusion

As regards the assessment by the management, the analysis of the results of the controls in place, as shown in the indicators outlined above, and the examination of the evidence available, all suggest that DG Research and Innovation's management is in a position to provide unqualified reasonable assurance on the following areas:

- Policy-development activities;
- The processes relating to the selection of contractors and beneficiaries for Horizon 2020 projects and its underlying financial operations (legal and financial commitments);
- Payments relating to administrative expenditure and procurement;
- Horizon 2020 pre-financing payments for grants;
- Management of the RSFF/INNOVFIN financial instruments and the underlying financial transactions with the EIB and EIF;
- Payments to Joint Undertakings;
- The operating subsidy paid to the Executive Agencies.

In view of our responsibility for the indirect management of the parts of our budget via the cross-delegated AODs, Executive Agencies and entrusted entities mentioned above, we can conclude that there are no control weaknesses affecting assurance.

Based on the control results on the legality and the regularity of the underlying transactions, the following areas are subject to a reservation annexed to the declaration of assurance:

- Payments in reimbursement of cost claims under FP7;
- Payments in reimbursement of cost claims under RFCS.

In the light of concerns expressed in the 2013 discharge procedure, DG RTD has considered whether a reserve on all FP7 expenditure is appropriate, or whether it can be limited to certain parts of FP7 expenditure.

Firstly, it should be noted that, already in previous years, certain parts of FP7 expenditure were not covered by a reserve where there was evidence that the risks (and so the residual error rates) are significantly lower than for all expenditure. Within RTD this applies to expenditure given to IMI, BBI, Cleansky and FCH. Outside DG RTD, this also applies to expenditure by REA under the Marie Curie programme, and all

expenditure from the ERCEA.

However, the main collaborative research programme of FP7 managed by DG RTD cannot be sub-divided in terms of risk. Many of the same beneficiaries appear in each of the thematic areas (transport, health, etc), all have their share of SMEs and new entrants, the control system is precisely the same. Research spending is also not divided by Member State. Consortia must have a multinational character, and many beneficiaries are also present in several Member States. The representative sample covers all thematic areas without distinction.

Finally then, DG RTD concludes that its FP7 grant portfolio under direct management, made up of collaborative projects, cannot be divided up into different risk categories, and so any reserve must cover all of this portfolio. And for FP7 a residual error rate of 2.88% is above the materiality level set in the standing instructions and so a reserve must be made. For the indirect management parts of our budget entrusted to other entities, we can conclude that there are no control weaknesses affecting the assurance.

As stated above, DG RTD considers that its overall control strategy ensures that trust, control and other policy objectives are kept in balance and that aiming to achieve a residual error rate of 2% at all costs is not a viable approach. This was set out explicitly in the financial statement accompanying the Horizon 2020 legislation, which was accepted by the legislative authority.

DG RTD is also concerned about the obligation to make a reserve covering all of its directly managed FP7 expenditure, when in fact it can give full assurance over 97% of this expenditure. This gives a misleading impression about the overall standard of financial management in the DG. However, at the moment, and given the Standing Instructions for the assessment of reserves, DG RTD maintains a reserve for FP7 expenditure against cost statements in 2015.

In conclusion, management has reasonable assurance that, overall, suitable controls are in place and working as intended; risks are being appropriately monitored and mitigated; and necessary improvements and reinforcements are being implemented. The Director General, in his capacity as Authorising Officer by Delegation has signed the Declaration of Assurance albeit qualified by two reservations concerning FP7 and Coal and Steel.

3. DECLARATION OF ASSURANCE

I, the undersigned,

Director-General of DG Research and Innovation

In my capacity as authorising officer by delegation

Declare that the information contained in this report gives a true and fair view⁹⁵.

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and 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.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the self-assessment, ex-post controls, the opinion of the Internal Auditor on the state of control, the observations of the Internal Audit Service and the lessons learnt from the reports of the Court of Auditors for years prior to the year of this declaration.

Confirm that I am not aware of anything not reported here which could harm the interests of the institution.

However the following reservations should be noted:

- *Payments in reimbursement of cost claims under the Seventh Framework Programme;*
- *Payments in reimbursement of cost claims under the Coal and Steel Research Fund.*

Brussels,

[Signed in ARES]

Robert-Jan Smits

Director General

⁹⁵ True and fair in this context means a reliable, complete and correct view on the state of affairs in the DG.

3.1 Reservation FP7

DG	RTD
Title of the reservation, including its scope	Reservation concerning the rate of the residual error within cost claims in the Seventh Research Framework Programme (FP7), implemented directly by DG RTD.
Domain	Direct management grants paid by DG RTD in the 7 th FP.
ABB activity and amount affected (= "scope")	08.025100; 08.035100 Payments made directly by DG RTD (including Euratom expenditure) and the cross-subdelegated budget, amounting to a total of EUR 1 472,42 million .
Reason for the reservation	At the end of 2015, the residual error rate is not below the materiality threshold foreseen for the multi-annual period.
Materiality criterion/criteria	The materiality criterion is the residual error rate, i.e. the level of errors that remain undetected and uncorrected, by the end of the management cycle. The control objective is to ensure that the residual error rate on the overall population is below 2% at the end of the management cycle. As long as the residual error rate is not below 2% at the end of a reporting year within the FP's management lifecycle, a reservation would be made.
Quantification of the impact (= actual exposure)	The maximum impact is calculated by multiplying the residual error rate in favour of the Commission by the amount of FP7 payments based on cost statements (and clearings) authorised in 2014 by RTD. Based on the results of audits, it is estimated that the Residual Error Rate is 2.88%. The estimated impact in 2015 is EUR 89,57 million.
Impact on the assurance	Legality and regularity of the affected transactions, i.e. only payments made against cost claims (interim payments and payments of balance). The impact on assurance is limited by the reduced net financial impact that will occur in some cases where eligible expenditure is limited by budget ceilings.
Responsibility for the weakness	The main reason for errors is : - the complexity of the eligibility rules as laid down in the basic acts decided by the Legislative Authorities, based on the reimbursement of actual eligible costs declared by the beneficiaries; - the fact that there are many thousands of beneficiaries making claims, and not all can be fully controlled. The different control provisions set out by the Commission services, along with the audit certificates on financial statements and ex-post audits, can mitigate these risks to a certain extent, but can never be carried out on 100% of the cost claims received.
Responsibility for the corrective action	The possibilities to simplify the FP7 rules have been exhausted, although there is some evidence that the simplification measures introduced in 2011 reduced errors. The remaining scope to reduce errors will be addressed in particular through the following actions: - continuing its on-going efforts to give guidance and feedback to the participants and certifying auditors to prevent errors occurring; - continuing efforts to give guidance and specific trainings to the staff involved in ex-ante controls; - continuing with its control and audit work in order to further reduce the FP7 residual error rate: a third common representative audit sample has been launched.

3.2 Reservation Coal and Steel Research Fund

DG	RTD
Title of the reservation, including its scope	Reservation concerning the rate of the residual error within cost claims in the Coal and Steel Research Fund (C&S RF), implemented directly by DG RTD.
Domain	Direct management grants paid by DG RTD in the C&S RF.
ABB activity and amount affected (= "scope")	08.050100 and 08.050200 Payments made by DG RTD : EUR 44.74 million
Reason for the reservation	At the end of 2015, the estimated residual error rate is not below the materiality threshold foreseen for the multi-annual period.
Materiality criterion/criteria	The materiality criterion is the residual error rate, i.e. the level of errors that remain undetected and uncorrected, by the end of the management cycle. The control objective is to ensure that the residual error rate on the overall population is below 2% at the end of the management cycle. As long as the residual error rate is not below 2% at the end of a reporting year within the programme's management lifecycle, a reservation would be made.
Quantification of the impact (= actual exposure")	The maximum impact is calculated by multiplying the residual error rate in favour of the Commission by the amount of FP7 payments based on cost statements authorised in 2015 by RTD. It is estimated that the Residual Error Rate is 3% . The estimated impact in 2015 is EUR 1.34 million .
Impact on the assurance	Legality and regularity of the affected transactions. The impact on assurance is limited by the reduced net financial impact that will occur in some cases where eligible expenditure is limited by budget ceilings.
Responsibility for the weakness	The main reason for errors is : - the complexity of the eligibility rules as laid down in the basic acts decided by the Legislative Authorities, based on the reimbursement of actual eligible costs declared by the beneficiaries; - because of the fact that the Grant agreement terms are very similar but not exactly the same than for FP7 projects, errors occur when beneficiaries apply FP7 rules for their cost claims. The different control provisions set out by the Commission services, and ex-post audits, can mitigate these risks to a certain extent, but can never be carried out on 100% of the cost claims received.
Responsibility for the corrective action	An amendment of the Coal and Steel legal base has been requested by the College to the Council. The aim is to update the grant agreement in order to approach as much as possible the current H2020 Framework programme's rules.