



Annual Activity Report 2022

DG RESEARCH AND INNOVATION

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DG R&I IN BRIEF

The Directorate-General for Research and Innovation (DG R&I) is responsible for the EU policy on research, science and innovation with a view to help create growth, jobs, tackle our biggest societal challenges and secure the EU technological sovereignty.

The DG, under supervision of **Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth**, contributes to **all the headline ambitions of Commission President von der Leyen**.



Faced with the long-term social and economic effects of the global pandemic and with the Russian military aggression of Ukraine, our vision remains unchanged: **a sustainable, safe, fair and prosperous future for people and planet**, based on solidarity and respect for common European values.



Our mission is to design and implement research and innovation policies and programmes in collaboration with the Member States, international partners, stakeholders and citizens. These policies and programmes, supported by investment and relevant regulation, will **deliver new knowledge and game-changing innovation for the green and digital transformation**. We aim to have a high scientific, technological and societal impact, built on scientific evidence and strong input from citizens.

In 2022, DG R&I continued to design R&I policies in the context of the **European Research Area**, including the first ERA Policy Agenda (2022-2024), implemented the **Global Approach to R&I** and prepared the **New European Innovation Agenda**. DG R&I implemented the **Horizon Europe framework programme** and the **Euratom** programme. The approach taken for Horizon Europe foresees to work with the delegation of its implementation to Executive Agencies and other bodies. Furthermore, the DG supported the development of the **EU Missions** and the implementation of **European Partnerships** in view to address global challenges.

The DG organises its directorates around the **European Research and Innovation policy, the Global Approach** and three key dimensions of sustainable development - **People, Planet, and Prosperity**. This is completed by the Directorates in charge of **Innovative Administration**, the **Common Policy Centre (CPC)** and the **Common Implementation Centre (CIC)**.

This architecture of the DG aims at breaking silos and facilitating a horizontal flow of information and skills. Close cooperation with other Commission's services facilitates the **co-creation of policies and strategic priorities for the implementation of Horizon Europe**. We put strong emphasis on **engagement with citizens and society** and the strategic role of **data analysis and business intelligence**.

Ms Signe Ratso has taken the position of acting Director-General as from September 2022 until 15 February 2023 after the end of Mr. Jean-Eric Paquet's mandate. Mr Marc Lemaître has become Director-General of DG R&I as from 16 February 2023.

DG RESEARCH & INNOVATION SPECIFIC OBJECTIVES TO THE COMMISSION'S HEADLINE AMBITIONS¹

GENERAL OBJECTIVE 1: A EUROPEAN GREEN DEAL

- ◆ **Specific objective 1.1:** High-quality science, knowledge and innovative solutions support climate policies and help to preserve biodiversity, ecosystem and natural resources
- ◆ **Specific objective 1.2:** Mainstreaming of the public and private research and innovation investments for climate actions strengthens the European Green Deal's impact
- ◆ **Specific objective 1.3:** Co-creation of Horizon Europe and its missions and partnerships increases awareness of the key role of research and innovation for achieving climate neutrality

GENERAL OBJECTIVE 2: A EUROPE FIT FOR THE DIGITAL AGE

- ◆ **Specific objective 2.1:** High-quality science, knowledge and innovative solutions facilitate a digital transition in Europe, including a new European approach to Artificial Intelligence
- ◆ **Specific objective 2.2:** The revitalised European Research Area sets directions for societal, economic and ecological transitions in Europe and contributes to spreading excellence, closing research and innovation gap and working out a common global response to emerging challenges
- ◆ **Specific objective 2.3:** Research and innovation actions and the European Innovation Council in particular support development and scaling-up of SMEs with breakthrough and disruptive technologies

GENERAL OBJECTIVE 3: AN ECONOMY THAT WORKS FOR PEOPLE

- ◆ **Specific objective 3.1:** Research and innovation actions, increased R&I investments and the R&I component of the European Semester boost economic growth and jobs creation

GENERAL OBJECTIVE 4: A STRONGER EUROPE IN THE WORLD

- ◆ **Specific objective 4.1:** Regional research and innovation strategies and broader association policy contribute to promoting common European R&I values and creating a global Research and Innovation Space

GENERAL OBJECTIVE 5: PROMOTING OUR EUROPEAN WAY OF LIFE

- ◆ **Specific objective 5.1:** Research and innovation develop and deploy solutions, technologies and innovations to tackle emerging threats and improve crisis preparedness
- ◆ **Specific objective 5.2:** Research and innovation support the European health initiatives, including the European plan to fight cancer

GENERAL OBJECTIVE 6: A NEW PUSH FOR EUROPEAN DEMOCRACY

- ◆ **Specific objective 6.1:** European research and innovation support citizens' involvement, social inclusion and equalities in Europe, including through communication of the European R&I added value

GENERAL OBJECTIVE 7: A MODERN, HIGH PERFORMING AND SUSTAINABLE EUROPEAN COMMISSION

- ◆ **Specific objective 7.1:** The Common Implementation Centre and the Policy and Programming Centre provide user-friendly services and tools to the European Commission for effective and efficient planning, programming and implementation of the Research and Innovation Framework Programme and other EU programmes

¹ The general and specific objectives are defined in the Strategic Plan 2020-2024

EXECUTIVE SUMMARY

This annual activity report is a management report of the Director-General of DG Research and Innovation to the College of Commissioners. Annual activity reports are the main instrument of management accountability within the Commission and constitute the basis on which the College takes political responsibility for the decisions it takes as well as for the coordinating, executive and management functions it exercises, as laid down in the Treaty on European Union (Article 17(1)).

A. Key results and progress towards achieving the Commission's general objectives and DG's specific objectives

In 2022, the Directorate-General contributed to the seven General Objectives of the Commission. This was a crucial year in the effort “to build a true **European Research Area** in which we pull together all national and European efforts”², as President von der Leyen requested in her mission letter to Commissioner Mariya Gabriel. The DG continued **to tackle climate change and to focus on the digital transition** using its analytical ability, with dedicated strategic reports, foresight and economic analysis providing insights to direct R&I investments. It continued to contribute to spreading excellence, closing the research and innovation gap in the EU and formulating a common global response to emerging challenges. In addition, it provided the policy framework to enhance R&I investment at the national level and assess from an R&I perspective the national reform plans. **Horizon Europe**, EU's programme for Research and Innovation, has strengthened the impact of R&I in supporting EU policies while tackling global challenges. It contributed to create jobs, promote industrial competitiveness and optimise investment impact.

Through Horizon Europe, DG R&I supported the development and deployment of solutions for **the European Green Deal**, and worked towards the achievement of the 35% target for climate action expenditure in Horizon Europe. Beside supporting the **EU Missions** contributing to the green transition (Adaptation to Climate Change, Restoring our Ocean and Waters, 100 Climate-Neutral and Smart cities, Soil for Europe), the DG supported the **EU Biodiversity Strategy for 2030**, two **ERA industrial technology roadmaps**, the **Clean Hydrogen Joint Undertaking**, and started the preparatory work for the revamp of the **SET Plan**. For example, in 2022, 100 EU cities and 12 cities from associated countries joined the **EU Cities' Mission** to scale and speed up climate actions, and to become climate neutral by 2030. More details on the Green Deal can be found in part 1 – general objective 1.

The DG continued to support the development of actions and solutions for the digital age, in particular towards building the **European Research Area (ERA)**. It established at the beginning of 2022 **the new ERA Forum** as a Commission expert group, bringing together Member States and stakeholders. Based on detailed explanatory documents, the ERA Forum successfully shaped the content of all **ERA Policy Agenda actions**, followed by a

² https://ec.europa.eu/commission/commissioners/sites/default/files/commissioner_mission_letters/mission-letter-mariya-gabriel-2019_en.pdf

commitment exercise. Among the many successes already achieved within this ambitious agenda, Commission and Member States showed a strong commitment to progress on the reform of Research assessment, with the kick-start of the large, dedicated **Coalition for Advancing Research Assessment (CoARA)** and dedicated Council conclusions adopted on 10 June 2022.

The DG contributed to the Council Presidencies' agendas, in particular the Council Conclusions on Research assessment and implementation of **Open Science**, the Council Conclusions on **Research Infrastructures**, the Council Conclusions on a **New European Innovation Agenda**, the Council Conclusions on **Widening**, the **Prague declaration** on synergies in research and innovation funding in Europe, and the **Brno declaration** on Fostering Global ecosystem of Research Infrastructures. More details on the digital age can be found in part 1 – general objective 2.

2022 was also a milestone year for European Innovation, with the Communication on the **New European Innovation Agenda**, the first overarching innovation strategy after many years, contributing to the Research & Innovation objectives through its flagship actions on access to finance, framework conditions, EU innovation ecosystems, talents and innovation policy. Similarly, the **European Innovation Council (EIC)** has shown its strong impact and capabilities to identify and support breakthrough technologies and scale up highly innovative startups, as exemplified in the dedicated section. **The restructuring of the EIC Fund**, the key instrument to identify, develop and scale up deep tech innovation in Europe, signifies the accomplishment of another substantial milestone for 2022.

DG R&I supported **the further development of the EU missions**, including by initiating a tour of the Member States to discuss and develop appropriate governance, monitoring and assessment arrangements, launching a network of EU Missions National Contact Points. It has also supported a strategic, coherent and impact-focussed **preparation of the 2nd wave of European Partnerships**. The DG published the first Biennial Monitoring Report on European Partnerships, which provides a strong evidence base to guide the implementation of European Partnerships and co-organised the first Partnerships Stakeholder Forum covering all forms of partnerships.

The DG demonstrated flexibility and reactivity **reacting rapidly to the Russian invasion of Ukraine**, by immediately suspending payments to Russian participants in ongoing projects as well as the signature of new grants. In addition, DG R&I, **contributed to the 5th package of sanctions** which provided the legal basis to terminate the participation of all Russian public entities in ongoing projects.

DG R&I was actively involved in the monitoring of all **national Recovery and Resilience Plans**, covering the R&I dimension both in terms of investments and reforms. In addition, the DG has actively and successfully contributed to highlighting the importance of R&I for the recovery, the green and digital transitions and **the need to decrease our energy dependency from Russia, and the REPowerEU Plan**.

DG R&I continued to work on **synergies** between Horizon Europe and other funding programmes. This included specific synergy actions with targeted EU programmes such as the Innovation Fund (IF) and the Connecting Europe Facility (CEF), and via the **new Guidance document** prepared together with DG REGIO, with the objective to mobilise under-exploited R&I potential across the Union, to improve access to Excellence, reduce the innovation divide, to boost stronger R&I ecosystems. The guidance document was published on 5 July 2022 together with **the New European Innovation Agenda**.

The DG has also supported the concept of **Industry 5.0. The winner of the Industry 5.0 Award**, which is a recognition prize for EU-funded projects that advance this vision by presenting convincing and inspiring solutions, was announced **at the R&I Days**. More details on the economy for the people actions can be found in part 1 – general objective 3.

On the international level, DG R&I was mainly focused on the implementation of the **Communication on the Global Approach to R&I**. This has included enhancing our cooperation with key partners such as the US, moving ahead with the nuanced approach to cooperation with China in line with the agreed Joint Roadmap and further developing an EU-African Union Innovation Agenda including through a major stakeholder conference in Nairobi. Following the ‘Marseille Declaration’ agreed by EU Ministers in March, DG R&I has launched a multilateral dialogue, on the principles and values underpinning international R&I cooperation. This brings together more than 50 countries (including the US and China) to work together towards a common international understanding of the application of these principles and values. The DG continued to contribute to a strong international dimension with targeted international actions, multilateral cooperation and exploratory talks, negotiations as well as **signature of association agreements**. More details on the international cooperation can be found in part 1 – general objective 4.

The challenges of human health and well-being have been addressed by DG R&I all along 2022 with different strategies and actions via the supervision and continued development of different **Partnerships** on health topics as well as concrete actions to fight **the Covid pandemic, Cancer and other diseases**. The DG continued to build **resilience and preparedness strategies for future pandemics**. More details on the actions on promoting our European way of life can be found in part 1 – general objective 5.

The European Commission is committed to strengthening **European democracy** by giving citizens a bigger say and protection against threats like foreign interference, misinformation, and hate speech. In 2022, the DG provided significant inputs on R&I policy and actions in the Staff Working Document (SWD) that accompanied the Communication on **the Future of Europe** adopted in June 2022. Among activities towards social inclusion and equality in Europe, DG R&I worked with a special focus on the **Gender Equality** activities in both Horizon Europe and the new ERA, more details on the actions on “new push for a European Democracy” in part 1 – general objective 6.

The **Common Implementation Centre (CIC)** together with **the Common Policy Centre (CPC)** have provided the framework for implementing the Research & Innovation framework

programme. They have provided their analytical, legal, budgetary support as well as feedback to policy-making, dissemination and exploitation of results to the benefit of the stakeholders and to the members of the R&I family in the Commission. The CPC's activities have turned EU policy priorities into R&I investment priorities with:

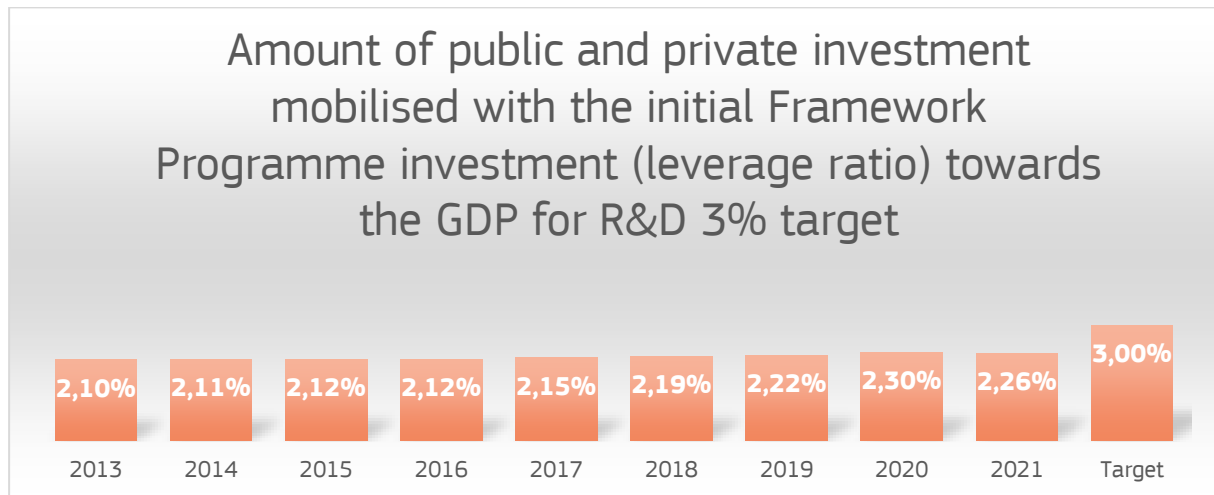
- **the latest amendment of the 'main' Horizon Europe work programme 2021-2022**, adopted on 10 May 2022 and increasing the budget of this work programme by nearly €562 million to further support EU Missions towards innovative solutions to green, health and digital challenges and more actions to boost the European innovation ecosystem. Following **Russia's invasion of Ukraine**, the amendment has included actions to support researchers previously active in Ukraine.
- **the adoption of the 'main' Horizon Europe work programme 2023-2024** on 6 December 2022, with around EUR 13.5 billion to support researchers and innovators in Europe to pursue breakthrough solutions for environmental, energy, digital and geopolitical challenges.

More details on the actions on **a modern, high performing and sustainable European Commission** can be found in part 1 – general objective 7.

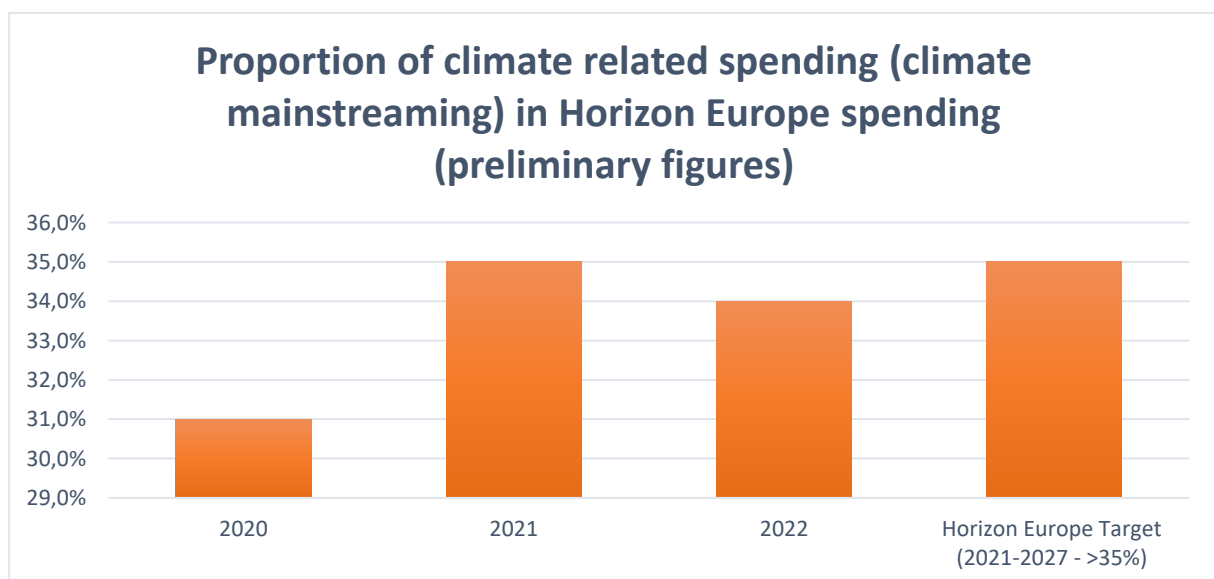
Communication activities remained a top priority for DG R&I in 2022 in order to pass key messages to expert and non-experts in R&I. The most important and visible communication event organised was **the R&I Days** in September 2022. Like in 2021, the successful event was organised virtually, and it gathered many stakeholders whose constructive feedback will be used for the next edition in 2023. In December 2022 the largest ever open public stakeholder consultation on the past, present and future of the Framework programme was launched for 12 weeks. It will feed into the preparations of the second Horizon Europe Strategic Plan and the evaluations of the Framework Programme.

B. Key performance indicators

1. Amount of public and private investment mobilised with the initial Framework Programme investment (leverage ratio) towards the GDP for R&D 3% target (Result indicator 8 in the performance tables - specific objective 2.1)



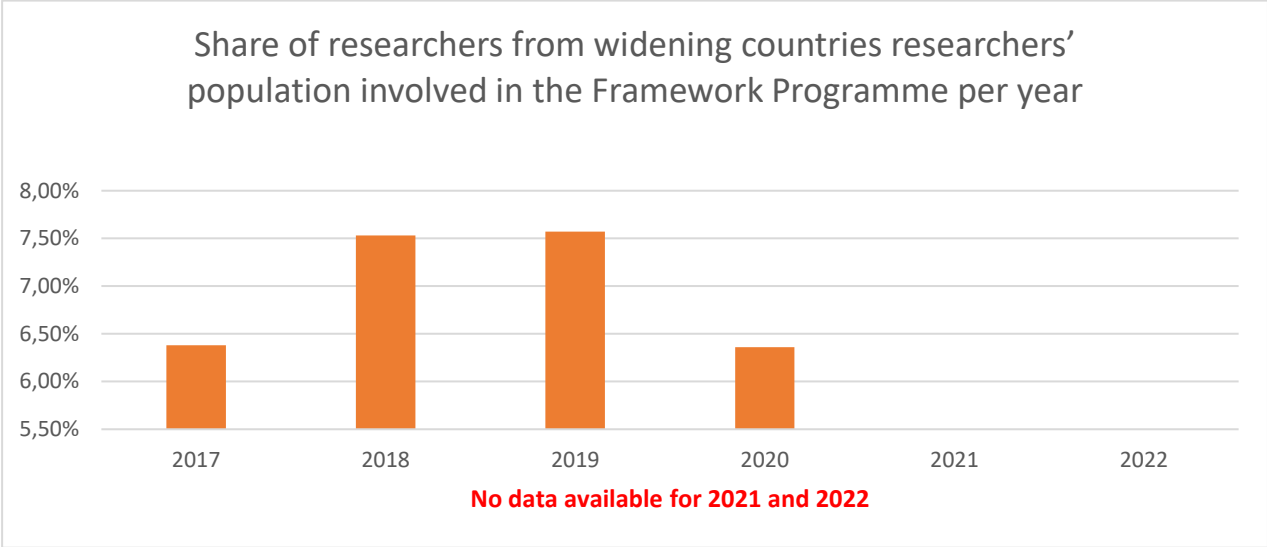
2. Proportion of climate related spending (climate mainstreaming) in Horizon Europe spending (Result indicator 3 in the performance tables - specific objective 1.2)



3. Progress towards R&I missions' targets related to the European Green Deal (Result indicator 5 in the performance tables - specific objective 1.3)

Data for 2022 not yet available as EU Missions were only launched in the 2nd half of 2021.

4. Share of researchers from widening countries researchers' population involved in the Framework Programme per year (Result indicator 10 in the performance tables - specific objective 2.2)



C. Key conclusions on financial management and internal control

In line with the Commission's Internal Control Framework DG Research and Innovation has assessed its internal control systems during the reporting year and has concluded that it is effective and the components and principles are present and functioning well overall, but some improvements are needed as some deficiencies were identified. Please refer to annual activity report section 2.1.3 for further details.

In addition, DG Research and Innovation has systematically examined the available control results and indicators, including those for supervising entities to which it has entrusted budget implementation tasks, as well as the observations and recommendations issued by the internal auditor and the European Court of Auditors. These elements have been assessed to determine their impact on management's assurance about the achievement of the control objectives. Please refer to Section 2.1 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. Improvements are necessary concerning the reporting on Horizon programmes, the transfer of personal data to third countries, the Controllershship of the funding and tenders' portal and the governance framework of the EIC programme including its supervision. The following actions are/will be taken in this respect:

- Review of the process for the validation of the data used in reporting (including AMPR/PPOs).
- Implementation of processes ensuring transfers of personal data to third countries exclusively using a proper transfer tool as per the EU Data Protection Regulation 2018/1725.
- Finalisation of the Joint-Controllershship Arrangement covering all onboarded parties and all jointly processed personal data operations via the EU Funding & Tenders Portal for the 2021-2027 Multiannual Financial Framework.
- Finalisation of the MoU for Horizon Europe ensuring that it reflects all the key activities performed by EISMEA, including those related to the EIC Fund. Preparation of a proposal revising the delegation instrument (Commission Decision C(2021)949), Definition of clear rules on the conflict of interest/(in)compatibility between functions. Finally, analysis of the staffing needs related to the responsibility of DG R&I to supervise and monitor the EIC Fund and the preparation of the EIC Work Programme.

The Director-General, in his capacity as Authorising Officer by Delegation, has signed the Declaration of Assurance albeit qualified by a reservation on reputational grounds concerning the late implementation and weaknesses affecting the governance and control systems of the investment component of the Accelerator scheme of the European Innovation Council (EIC) Programme within Horizon Europe, delegated to the European Innovation Council and SMEs Executive Agency (EISMEA).

D. Provision of information to the Commissioner(s)

In the context of the regular meetings during the year between DG Research and Innovation and the Commissioner on management matters, the main elements of this report and assurance declaration, including the reservation envisaged, have been brought to the attention of Commissioner Mariya Gabriel, responsible for Innovation, Research, Culture, responsible for Education and Youth.

1. KEY RESULTS AND PROGRESS TOWARDS ACHIEVING THE COMMISSION'S GENERAL OBJECTIVES AND SPECIFIC OBJECTIVES OF THE DEPARTMENT

General objective 1: A EUROPEAN GREEN DEAL

The DG's contribution to the 'A European Green Deal' headline ambition is reflected by the following specific objectives. The performance tables are included in the annexes on page 22:

- Specific objective 1.1: High-quality science, knowledge and innovative solutions support climate policies and help to preserve biodiversity, ecosystem and natural resources
- Specific objective 1.2: Mainstreaming of the public and private research and innovation investments for climate actions strengthens the European Green Deal's impact
- Specific objective 1.3: Co-creation of Horizon Europe and its missions and partnerships increases awareness of the key role of research and innovation for achieving climate neutrality.

In 2022, DG R&I actively contributed to the **European Green Deal** by supporting different initiatives in science and innovation. In total, the amended 'main' Horizon Europe work programme 2021-2022 has reached a budget of around EUR 15,98 billion contributing EUR 7 billion to climate action. In addition, the 'main' work programme 2023-2024 was adopted on 6 December 2022 and will contribute towards the achievement of the 35% target for climate action expenditure.

In 2022, DG R&I ensured significant progress with the four EU missions under the 'Green Deal': **Soil health, Oceans, Climate Adaptation, and Cities**. They will contribute to deliver on the European Union's 2030 targets for protecting and restoring ecosystems and biodiversity, for zero pollution, and for decarbonisation and reduction of net greenhouse gas emissions towards climate neutrality.

In 2022, supporting activities were launched for the **Soil Mission**: the first wave of 20 living labs were selected, the DG enhanced the cooperation with Member States through the creation of Soil Mission mirror groups and the development of national action plans, and continued the cooperation with the JRC and the European Soil Observatory.

For the **Mission Adaptation to Climate Change**, 372 regional and local authorities have successfully applied in 2022 to join the Mission. The members of its implementation platform have been selected and will be operational in 2023. The DG aims at establishing closer cooperation between Mission Adaptation and selected EU Partnerships with highest relevance for building climate resilience.

The **Ocean and Waters Mission** aims to protect and restore the health of our ocean and waters, supporting regional engagement and cooperation through area-based "lighthouses"

in major sea/river basins. In 2022, the DG organised a series of stakeholder consultations and events for the different sea basins and Lighthouses.

About the progresses of **Climate Neutral and Smart Cities Mission**, in 2022 100 EU cities and 12 cities from associated countries were selected for participation in the Mission, and started their work on “**Climate City Contracts**” with the help of a **Mission Platform**, which has been operational since September 2022. Also a new Mission Board has been operational since October 2022, and the Cities Mission part of the ‘main’ Horizon Europe work programme for 2023 was agreed and published. It contains notably a joint call with the Adaptation Mission on urban regeneration, and an action to associate Ukrainian cities to the Cities Mission. Furthermore, the Towards zero emission road transport (**2Zero**) and the Cooperative, connected and automated mobility (**CCAM Partnerships**) co-created a joint call with the Cities Mission with the objective of developing automated zero emissions mobility solutions tailored to future urban mobility needs.

In November 2022, 48 cities worldwide were selected to form the first cohort of cities participating under the **Urban Transition Mission (UTM)** of Mission Innovation, which is co-lead by the Commission

The cross-cutting work on EU missions has also included work on **building the Missions portfolios (list of relevant projects and results, for each Mission, from Horizon Europe, Horizon 2020, and where relevant, from other EU programmes)**, which are available on dedicated spaces of the Horizon Dashboard and on the public Horizon Results Platform. These portfolios can contribute to shape Missions and support their operational aspects. A **dedicated governance structure for EU Missions** at EU level has also been developed and presented to the Member States. The governance structure includes **Mission managers** to steer the implementation of the Missions, **Mission secretariats** to support them, **Mission boards** to provide advice on formulation and implementation of Missions, and **Mission owner groups** for all services interested in the Mission. **Interministerial roundtables at national level** were organised to raise ownership on EU missions at national level, including to develop appropriate governance arrangements. A network of **EU Missions National Contact Points** has been launched in December 2022. The Competitiveness Council on 10 June 2022 adopted **Council conclusions related to EU missions**. The new Chairs and members of the **Mission Boards** of the five EU Missions were announced in September 2022. Their mandate will run from 2022 to 2025. The Mission Boards will promote the EU Missions by raising citizens’ awareness, advise on the actions of the Missions’ implementation plans and build on the work from the first phase that ran from 2019 to 2021.

The development and deployment of the **Food 2030 initiative** continued in 2022 through funding actions under Horizon Europe, the publication of a study on the state of play of food systems related R&I investments in Europe and by strengthening the complementarities and synergies with EIT Food – Knowledge and Innovation Community (KIC).

As part of the Circular Economy Action Plan, the **Circular Cities and Regions Initiative (CCRI)** was launched in 2022 the technical and financial support activities to help cities and regions in the implementation of their circular systemic solutions.

In 2022, DG R&I has cooperated with key scientists members of the **Intergovernmental Panel on Climate Change (IPCC)** in order to identify by mid-2023 the associated R&I climate science priorities in view of informing the future calls of Horizon Europe.

DG R&I supported the implementation of the **EU Biodiversity Strategy for 2030** through the different actions and projects related to R&I on biodiversity protection/restoration and nature-based solutions. In 2022, it also initiated the procedures for the preparation and adoption of a long-term **strategic biodiversity research agenda**.



Based on the Council's call to the Commission to report on the progress of the **bioeconomy and the Bioeconomy Strategy Action Plan**, DG R&I has coordinated the adoption of the Commission report "European Bioeconomy Policy: Stocktaking and future developments"³. Another major milestone for the **EU bioeconomy policy** was the organisation of the high-level **EU Bioeconomy conference** in October 2022.

The **Circular Bio-based Europe Joint Undertaking (CBE JU)** launched its first Call in June 2022, with a budget of 120 million EUR for 12 topics.

Horizontal support to the implementation of European Partnerships continued in 2022. The **first Biennial Monitoring Report on the performance of European Partnerships** was published in May 2022. The first edition of the **Partnership Stakeholders Forum 2022**, bringing together the whole community of co-funded, co-programmed and institutionalised partnership stakeholders at EU and national level took place in November 2022. The **Partnership Knowledge Hub**, has also been set up in 2022 under the Horizon Europe strategic planning process to enhance the collaboration between the Commission and the authorities responsible for the national coordination and participation in EU R&I partnerships

³ COM(2022)283 of 9 June 2022

. The identification process of **proposals for the second wave of EU Partnerships** to be supported under Horizon Europe second Strategic Plan was launched in co-creation with Commission services, and representatives of Member States and Associated Countries.

DG R&I prepared the assessment of **PRIMA**, the Partnership for Research & Innovation in the Mediterranean area, also exploring the future of the initiative after 2024, which is the end of its current active programming period.



DG R&I has monitored the increase of the budget of the **Clean Hydrogen Joint Undertaking** with €200 million, to double the number of Hydrogen Valleys in Europe by 2025, which will be implemented through dedicated calls in the work programmes of 2023, 2024 and 2025. Moreover, DG R&I carried out preparatory work to transform the **ERA Pilot on Green Hydrogen** into an Implementing Working Group under the revamp of the **Strategic Energy Technology (SET) Plan**. Progressing towards the adoption of the communication on the revamped **SET Plan**, planned for 2023, DG R&I carried preparatory work in collaboration with the French and the Czech presidencies.

Furthermore in relation to RePowerEU, DG R&I contributed to the **EU Solar Strategy** with three R&I actions: a solar energy flagship initiative under the Cluster 5 part of the Horizon Europe 'main' work programme 2023-2024, a dedicated R&I pillar in the new EU Solar Photovoltaics Industry Alliance, and the start of preparations for a joint strategic R&I agenda on solar energy in the ERA framework.

In line with the **Joint Communication on the EU external energy engagement in a changing world**, DG R&I continued to coordinate **Mission**

In 2022, **EUROfusion**, the co-funded European Partnership for fusion energy research, researchers used the Joint European Torus (JET) device to release a record **59 megajoules of sustained fusion energy**. These results are the clearest demonstration of the potential for fusion energy to deliver safe and sustainable low-carbon energy. This achievement comes as part of a dedicated experimental campaign designed by EUROfusion to optimally prepare for the start of **ITER project**

Innovation (MI). The landmark event in 2022 was the **Global Clean Energy Action Forum**, which hosted the first joint Ministerial meeting of Mission Innovation and the Clean Energy Ministerial in September 2022. The **Action Plan 2022-2024 of the Clean Hydrogen Mission** was adopted and the first call of interest for the **Urban Transitions Mission** was launched.

On the **Research Fund for Coal and Steel (RFCS)**, DG R&I launched in 2022 the Big Tickets Calls, which target large projects at high technology readiness levels, and the annual RFCS calls.

In the context of the **Chemicals Strategy for Sustainability**, DG R&I developed with DG ENV and JRC an assessment framework for chemicals and materials, annexed to the **Commission Recommendation on Safe-and-Sustainable-by-design (SSbD)** criteria⁴.



The DG also published the Strategic Research and Innovation Plan (SRIP) **for safe and sustainable chemicals and materials**. In 2022, DG R&I also launched the **Partnership for the Assessment of Risks from Chemicals (PARC)**, which brings together nearly 200 partners from 28 countries as well as EU agencies.

The Horizon 2020-funded European Joint program [HBM4EU](#) (2017-2022), predecessor of PARC, provided scientific evidence to support sound policy-making for chemical regulations in the EU. Through large-scale human biomonitoring, HBM4EU collected existing and generated new data between 2014 and 2021 from all European regions and developed a robust baseline of evidence for chemical exposure in the EU. The results of HBM4EU were used to support the [Zero Pollution Monitoring Assessment](#) and the [Commission proposal to revise the limit values for lead and its inorganic compounds and diisocyanates under Directives 98/24/EC and 2004/37/EC](#).

A restricted group of actors in the materials research developed the **Materials 2030 Manifesto** aiming at a unified, digitally-accelerated advanced materials development. To develop a plan to coordinate the R&I efforts on advanced materials and further engage

⁴ COM(2022) 8854 final of 8 December 2022

stakeholders, the platform **Advanced Materials 2030 Initiative (AMI)** has been launched in 2022 that gathered up hundreds of stakeholders. Through AMI, they developed a **Materials 2030 Roadmap**⁵ that was published in December 2022. The DG steered their work and ensured that the Roadmap is aligned with the DG's political priorities. DG R&I has worked on two **ERA industrial technology roadmaps**, which are fed into the sectoral transition pathways announced in the updated EU Industrial Strategy⁶. The first **technology roadmap for low-carbon industrial technologies in energy-intensive industries** provides comprehensive evidence on the state of play in the R&I development of relevant technologies and points to investment needs and other R&I action required to reduce industry's carbon footprint. The second **industrial technology roadmap on circular technologies**, ready for publication in January 2023, will address technologies and business models in the EU industrial ecosystems for construction, textiles and energy intensive industries.

Two **foresight** projects, "Stories from 2050" and "STI for Ecosystems Performance", were launched to complement foresight efforts of the European Environment Agency and other Commission DGs to support the implementation of the European Green Deal, especially, but not exclusively, through EU R&I policy and in particular through the future second Strategic Plan of Horizon Europe.

In 2022, the DG has provided horizontal and specific support for all pillars of Horizon Europe to account properly for **climate** and **biodiversity investments** in the call's topics and for large portfolios of projects like the European Research Council (**ex-ante estimates**). Assigned policy priorities-related trackers (climate action, biodiversity, digital) follow the performance framework for the MFF as communicated by DG BUDG, are documented in CPS (Call passport system) and shall serve as starting point for monitoring. Similarly, the DG has made an effort to align individual topics in the Horizon Europe work programme with the objectives and principles of the European Green Deal, particularly by integrating the **"Do No Significant Harm"** (DNSH) principle.

To support the Green Deal priority, a series of **external communication activities** have been carried out through 2022, with particular attention to the **EU Missions** and **Partnerships** contributing to the Green Deal priority. DG R&I organised the 4th edition of the **European Research and Innovation Days**, the European Commission's annual flagship Research and Innovation event, bringing together policymakers, researchers, entrepreneurs and the public to debate and shape the future of research and innovation in Europe and beyond. The inaugural edition of the **New European Bauhaus (NEB) Festival** brought together people from all walks of life to discuss and design a sustainable, inclusive, and beautiful future. With a direct reach of over 65,000 people, it featured more than 200 co-created local events - in Brussels and in over 20 EU countries, with activities ranging from concerts to conferences to fully-fledged festivals.

⁵ <https://www.ami2030.eu/roadmap/>

⁶ COM(2021)350 final of 5 May 2021

General objective 2: A EUROPE FIT FOR THE DIGITAL AGE

The DG’s contribution to the Commission’s headline ambition ‘Europe fit for Digital Age’ is reflected by the R&I actions under three following specific objectives included to performance tables in the annexes (page 26):

- Specific objective 2.1: High-quality science, knowledge and innovative solutions facilitate a digital transition in Europe, including a new European approach to Artificial Intelligence
- Specific objective 2.2: The revitalised European Research Area sets directions for societal, economic and ecological transitions in Europe and contributes to spreading excellence, closing research and innovation gap and working out a common global response to emerging challenges
- Specific objective 2.3: Research and innovation actions and the European Innovation Council in particular, support development and scaling-up of SMEs with breakthrough and disruptive technologies.

The **Industrial R&D Investment Scoreboard** is a flagship report on the largest industrial R&D investors EU and worldwide, showing industrial positioning in high-tech sectors and offering an insightful overview on industrial R&I capacities across sectors and industrial ecosystems. The 2022 edition was published on 13 December 2022, expanding on the preliminary data published in a policy brief on 29 June 2022.

DG R&I, through its funding programmes, has supported **innovative and visionary technology** accelerating Europe’s digital transition, like human-robot collaboration (HRC) systems. Six EU-funded projects working on HRC have joined forces in an Effective Industrial-Human Collaboration Cluster. The cluster’s objective is to disseminate state-of-the-art research and developments on collaborative robotics, which allow humans and robots to coexist and share production tasks.

The **Matrix Task Force on Artificial Intelligence** continued its work notably on the update of the R&I Investment Agenda on AI. In particular, it investigated, how the AI related R&I gaps identified in the prior analysis of the Work Programme 2021-2022 were taken up in the draft WP 2023-2024. The Task Force made recommendations on how to address a number of new gaps, which have been identified for the time being. The results were fed into the preparations of the WP 2023-2024. In October, the AI Matrix organised a workshop to kick start the **policy work around the impact of AI in R&I**, and in particular in science. This policy work should fulfil one of the main priorities stated in the AI Matrix mandate (“Develop a strategic way forward for DG R&I with regard to AI that complements existing activities. (...)”).

The **digital transition is accelerating**, and in particular progress on Artificial Intelligence (AI) and its applications in science has been remarkable in 2022. The impact that AI will have in R&I is major and transversal. DG R&I is dealing with this challenge in two main strands with significant steps in 2022: Analysing and optimising the AI-related investments in Horizon Europe, and starting to design a policy that can successfully improve and accelerate the uptake of AI as a tool in R&I.

Digital transition was also addressed through the **Joint Earth System Science Initiative** and a Horizon Europe coordinated call with the European Space Agency (ESA).

DG R&I co-chaired the **Group on Earth Observation (GEO)** and continued supporting the recently established Knowledge Centre on Earth Observation, managed in cooperation with the Joint Research Centre. The DG led the European contribution to the preparation of the GEO Post-2025 Strategy. New emphasis was set on the role of the GEO secretariat, the GEO work programme, and exploiting the European contribution and visibility in GEO through the **Copernicus programme** and **Destination Earth**.



The **Ocean Observation** activities supported the development of an advanced, international elaborated framework for the operation of an integrated Ocean Observing System that goes beyond the state-of-the-art and leaves a legacy of sustainability and enhanced coordination, with particular focus on the development of a **Digital Twin Ocean**.

The **European Co-Programmed Partnership on Connected, Cooperative and Automated Mobility (CCAM)** will support the development and testing of the next wave of Cooperative-ITS Services, to increase traffic efficiency, enable connected cooperative automated mobility, and improve road safety. The **CCAM and Driving Urban Transitions (DUT)** will all contribute to integrate zero-emission and digital mobility solutions for urban and peri-urban areas. Mission Innovation and its Urban Transitions mission, launched during COP26, will contribute to the international outreach of the Cities Mission.

In 2022 DG R&I coordinated and steered of the preparation and implementation of **the New European Innovation Agenda (NEIA)**⁷, which was adopted on 5 July 2022.

The new Agenda aims to position Europe at the forefront of the new wave of deep tech innovation and start-ups. It will help Europe to develop new technologies to address the most pressing societal challenges, and to bring them on the market. Europe wants to be the place

⁷ COM(2022) 332 final of 5 July 2022

where the best talent work hand in hand with the best companies and where deep tech innovation thrives and creates breakthrough innovative solutions across the continent..

The Communication on NEIA comprises five flagships:

- Funding Scale-Ups,
- Enabling innovation through experimentation spaces and public procurement,
- Accelerating and strengthening innovation in European Innovation Ecosystems across the EU,
- Fostering, attracting and retaining talents,
- Improving policy making tools (informed policy and policy support).

With the agreement of the Council, the Commission established at the beginning of the year the **new ERA Forum**, as a Commission expert group, bringing together Member States, stakeholders and associated countries, ensuring that the effort of developing the European Research Area is shared between the national and European levels.

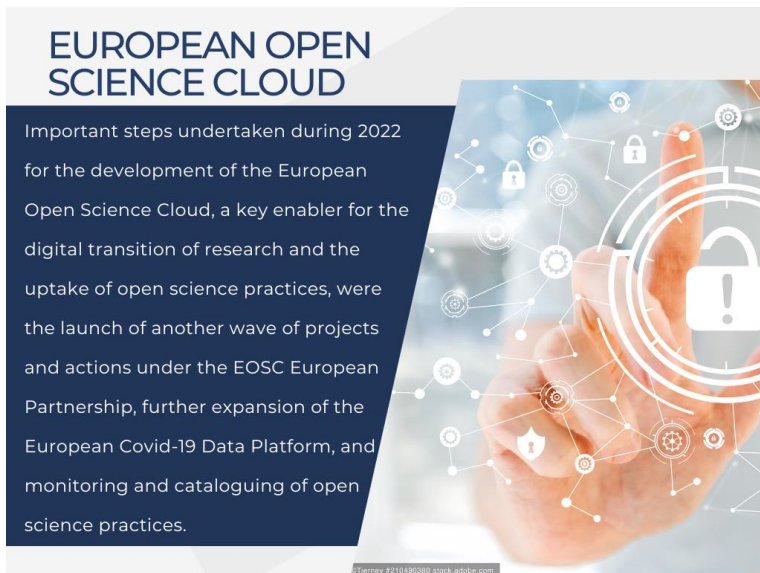


Based on detailed explanatory documents provided by the Commission, the ERA Forum successfully shaped **the content of all ERA Policy Agenda actions**. As a result, 17 out of 18 actions received the political support to move forward in order to ensure a broad political support and to provide opportunities beyond the participating States to benefit all Member States. Together with the competent services of

the DG, the ERA Forum is now coordinating the implementation of the ERA actions at EU and national level. These include actions on research assessment, careers, gender or knowledge valorisation, but also on academic freedom, international cooperation, hydrogen and bringing science closer to citizens. As such, they contribute not only to objective 2 (A Europe fit for the digital age) but also to other objectives, such as objectives 3 (An economy that works for people), 4 (A stronger Europe in the world) or 5 (Promoting our European way of life). Significant progress is being made in a number of actions, for example in action 1:

➤ **Enable Open Science, including through the European Open Science Cloud (EOSC)**

Several **EOSC thematic demonstrators** are being developed with a view to showcase EOSC added value, such as the Covid-19 Data Platform and the platform for marine data; these are complemented by a monitoring mechanism and a **catalogue of best practices**; furthermore, **sustainability options for EOSC post-2027** are being developed.



Important steps undertaken during 2022 for the development of the **European Open Science Cloud**, a key enabler for the digital transition of research and the uptake of open science practices, were the launch of another wave of projects and actions under the EOSC European Partnership, further expansion of the European Covid-19 Data Platform, and monitoring and cataloguing of open science

practices.

The **‘EOSC Tripartite Governance’** discussed the EOSC-related open science policy framework and monitor. Its key conclusions were the commitment to demonstrate EOSC added value and increase uptake of EOSC and Open Science by researchers in Europe, the advancement of monitoring (including a Catalogue of Best Practices), and the continued importance of the digital transition and FAIR data productivity (linked to the data spaces of the European Strategy for Data)

The **EURAXESS platform** helped facilitating an open and transparent recruitment and an improved access to research jobs in Europe. In 2022, more than 43.000 research institutions, universities and funding organisations are registered in the portal and have published more than 80,000 vacancies. In March 2022 the EURAXESS network, in cooperation with the Commission, organised the EURAXESS Biennial Conference. The theme of this year’s conference was the well-being of researchers, and in particular their mental health (notably in the context of the COVID-19 crisis but also the recent Russian aggression in Ukraine). Work has started in the course of May to prepare the terms of reference to transform the EURAXESS platform into the **ERA Talent Platform**. The ERA Talent Platform will be set up as a one-stop-shop online gateway to EURAXESS services, network and initiatives, including HRS4R⁸ and RESAVER⁹.

The conceptual model for a **European Competence Framework for Researchers (ResearchComp)** has been completed, with the addition of learning outcomes for each of the transversal competences for researchers. Following a final validation workshop held in September 2022, the official launch of the dedicated website is planned for Q2 2023 as part of the European Year of Skills.

⁸ [Human Resources Strategy for Researchers \(HRS4R\) | EURAXESS](#)

⁹ [RESAVER Home | RESAVER](#)

The launch of ResearchComp will mark the conclusion of the work on researchers' skills performed on the basis of the ERA Communication and the Skills Agenda, which led also to the update of the ESCO classification at the beginning of 2022.

During 2022, the Commission has facilitated the co-creation by stakeholders of an Agreement on **reforming research assessment** that identifies principles and concrete actions for changes. The Agreement was published in July and has since been signed by 426 organisations from 33 countries. Signatories are organisations involved with research assessment and their respective associations, including research funding organisations, universities, research centers, research infrastructures and other research performing organisations, national/regional assessment authorities and agencies, learned societies and researchers' organisations. In December, the **Coalition for Advancing Research Assessment (CoARA)** was launched during its Constitutive Assembly. The Coalition will support signatories of the Agreement in their reform journeys, by providing a platform to exchange experiences, mutually learn, support each other and get inspired. The Commission signed the Agreement on 8 November and joined the Coalition. At the same time, the Commission endorsed the San Francisco Declaration on Research Assessment (DORA).

The **study on the "European Research Data Landscape"** conducted surveys addressing more than 15.000 researchers and over 300 research data repositories. The final report of the study was published in November 2022. The findings of the study show that while certain FAIR practices are being adopted, and researchers are motivated by the ideals of Open Science, obstacles remain to making data FAIR and to share these in repositories.



An expert report of the **European Collaborative Cloud for Cultural Heritage (ECCCH)** was published in May. The ECCCH initiative was discussed at the French Presidency conference "Heritage for the Future, Science for Heritage", 15-16 March. A launch event was held on 21 June under the leadership of Commissioner Gabriel with high-level representatives of Member States and the European Parliament. This event marks the start of the policy dialogue with Member States on the

long-term governance of the ECCCH (beyond Horizon Europe funding). An open stakeholder survey was launched at the end of September, generating well above 1000 responses from European Cultural Heritage professionals, confirming the urgent need of a Cloud platform. In December, a report detailing the conclusions of the survey was published and a first call for proposal was launched to support the establishment of the ECCCH, outlining two topics with a foreseen budget of €35 Mission under the Cluster 2 of the Horizon Europe 'main' work programme 2023-2024 .

ESFRI launched an analysis of key issues addressed by the Council, including: the cooperation with industry, synergies of funding sources for research infrastructures, improving access as well as strengthening the impact, and international cooperation. The major work streams on **monitoring of ESFRI Landmarks** and on **landscape analysis** were both kicked off with workshops. In addition, the Commission and ESFRI launched with a workshop end of March discussions on the **research and innovation needs of European research infrastructures** and the operational support that could be provided under Horizon Europe. Furthermore, the **ESFRI 20th anniversary** conference was organised under the French Presidency to celebrate the achievements of EFSRI, highlighting the role it plays in enhancing European excellence in research and innovation.

The discussion on the ERA Policy Agenda Action 12 addressed the approach and methodology for developing a coordination mechanism for **Technology Infrastructures (TIs)**. The approach is built on an in-depth analysis and consultation illustrated by a Policy brief 'Towards the Implementation of an EU Strategy for Technology Infrastructures' published in early 2022, and a number of workshops, seminars and webinars with a broad range of experts and stakeholders. The high-level conference «*Europe's Green and Digital Transition: The Role of Technology Infrastructures in the new Pact for Research and Innovation*» under the auspices of the French Presidency on 23 June gave an opportunity to reflect on the role of technology infrastructures in the implementation of the key policy priorities of the Green Deal, the EU Chips Act and the Hydrogen Strategy, and to exchange ideas towards a more strategic approach to TIs and access to them.

Two of the first generation of Open Innovation Test Bed (OITBs) projects have finished and continue operating on a self-financed basis: [FormPlanet](#) providing services on sheet metals characterization, modelling and quality control; and [OASIS](#) which is focused on the scale-up of innovative smart lightweight composite materials and components.

Regulatory sandboxes are a means to test innovative technologies in real-world environments, provided that legislation is **innovation-friendly and contains experimentation clauses**⁽¹⁰⁾. In 2022, the DG R&I continued exchanges on current practices and lessons learned from the EU

and national experiences to embody this approach in EU missions and legislation. **Regulatory sandboxes were included in the New European Innovation Agenda adopted in July 2022, REPowerEU package and Recommendation on permitting of May 2022**, and a reinforced testing provision into the amended Renewable Energy Directive II, as a means to facilitate the uptake of new innovations in a fast-changing environment.

In the framework of ERA Action 2 "**EU copyright and data legislative and regulatory framework fit for research**", the Commission continued in 2022 its analysis to identify barriers, challenges and potential measures to address them. In the framework of this analysis, four independent expert studies were commissioned: two studies on EU copyright legislation and access to and reuse of scientific publications and data and two other studies

¹⁰ In line with the recent update of the Better Regulation Toolbox (see Tool #69). In cases where it could be relevant, this new policy instrument could be considered e.g. in impact assessments.

on EU data and digital legislation and research. **These studies were published in August 2022.**

Leiden (NL) was awarded title of the **“European City of Science” in the year 2022** – European Year of Youth- with the aim to foster mutual learning, scientific integration, interest for science among younger generations and the development of a borderless European research community across the continent. Amongst initiatives targeting youth, the EU funded two contests for young scientists and researchers: 33rd edition of EUCYS and 1st edition of pilot EU TalentOn.

- The European Union Contest for Young Scientists (EUCYS) is a science competition for 14 to 20 year olds. It brings together first prize-winners of national science contests for European finals giving students the opportunity to compete with the best of their peers at European level, attracting widespread media interest. The contest was set up to promote the ideals of cooperation and information exchange between young scientists.
- EU TalentOn contest brings together +100 early career researchers (21-35 years old) from across Europe and challenges them to find marketable solutions contributing to the most pressing global issues. The aim of the event is to facilitate cross-border and cross-sectoral collaboration among early-career researchers and to promote entrepreneurship spirit and boost entrepreneurial skills of young researchers.

Following the **ERA4You** initiative announced in the ERA Communication, aiming to increase intersectoral mobility and more balanced talent circulation, both a pilot action in Horizon Europe WIDERA 2022 work programme and a Mutual Learning Exercise (MLE) for Member States under the umbrella of the ERA Forum were launched.

2022 was an important year for the **European Innovation Council**.

In 2022, the second annual work programme of the EIC opened funding opportunities worth over €1.7 billion for breakthrough innovators to scale up and create new markets (EIC Accelerator €1.16 billion; EIC Pathfinder €350 million; EIC Transition €131 million).

The impacts and capabilities of the **European Innovation Council** in numbers: 12 deep tech Unicorns (\$1 billion value) and 112 Centaurs (\$100 million in annual recurring revenue); a strong pipeline of emerging technologies in critical areas for Europe’s future such as renewable hydrogen, cell and gene therapies and quantum technologies; and a first set of investments under the restructured EIC Fund that has leveraged EUR 2.6 in co-investment for every EUR invested by the EIC Fund. To date, **over 1 600 companies** across the 27 EU member states have been supported. The EIC also continues to outperform the market in supporting women-led companies.

The European Innovation Ecosystems (EIE) Work Programme 2022 amendment provided new funding opportunities for deep-tech start-ups led by women and the EU angel investment industry on top of existing actions that aim to create more connected and efficient innovation ecosystems.

The Member States and Associated Countries were engaged in conversations on innovation policy through the **EIC Forum**. In the first half of 2022, working groups had been kicked-off: innovation policy, innovation procurement, data, and the EIC Prizes Alumni network and plug-

in to the EIC Accelerator working group continued its work. As a first input to the preparation of the New European Innovation Agenda (NEIA), the working group on innovation policy, composed by the representatives of the MS and ACs provided their input to the call for evidence. On December 7, 2022, the EIC Forum Plenary discussed the Agenda's progress and approved the creation of a sixth working group on employee stock options in 2023 as well as the EIC Forum policy orientations 2022.

EIC Accelerator blended finance facility The DG continued the preparation of all instruments necessary for the restructuring and the subsequent move to indirect management of the EIC Accelerator blended finance facility, ensuring the objective of the EIC accelerator to provide timely equity support to innovative start-ups engaged in breakthrough innovation. With the support of EISMEA, it prepared the **1st Commission Decision on the restructuring of the EIC Fund** (establishing a Horizon Europe compartment, endorsing the new investment advisory agreement with the EIB, pre-selecting candidates for the role of the external fund manager) and the **2nd Commission Decision on the restructuring of the EIC Fund** (endorsing the agreement with the external fund manager).

General objective 3: AN ECONOMY THAT WORKS FOR PEOPLE

The DG's contribution to the 'An Economy that works for the people' headline ambition is reflected by the following specific objective. The performance tables are included in the annexes on page 34:

- Specific objective 3.1: Research and innovation actions, increased R&I investments and the R&I component of the European Semester boost economic growth and jobs creation

DG R&I made a significant contribution in 2022 to major Commission policy initiatives planned under the headline ambition 'An economy that works for people'.

Following a successful negotiation of all **national Recovery and Resilience Plans**, covering a strong R&I dimension both in terms of investments (around 48 billion euro estimated) and reforms, the DG has contributed in the monitoring of these plans. During this period, several Member States have engaged in fulfilling the first steps of the R&I investment commitments by issuing relevant calls, as well as implementing agreed R&I reforms. In addition, as part of the renewed **European Semester** process, the DG has actively and successfully contributed in highlighting the importance of R&I for the recovery, the green and digital transitions and **the need to decrease our energy dependency from Russia** in the Annual Sustainability Growth Survey and **the RepowerEU initiative**.

REPowerEU



In order to foster the engagement with Member States and support their move towards higher excellence, a new country-specific collaboration with Member States has been piloted based on **a set of high-level Enhanced Dialogues**. These are targeted, open and systematic mutual exchanges EC-Member States on R&I key topics aimed at further assisting Member States in designing and implementing a joint EU R&I policy. Czech Republic, Croatia, Lithuania, Greece and Estonia have signed up to the initial pilots, showing the high value of the initiative for both Member States and DG R&I. A strong pipeline of interested countries has also been created for 2023. Furthermore, the Policy Support Facility (PSF) 2.0 has developed in full swing and the PSF actions deployed in Greece, Croatia, Romania and Moldova have proved key in defining reform agendas for the whole or part of the R&I systems of these countries.

In view of the adoption of the Spring Package in May 2023, the DG has been working on a detailed and a deep analysis of the strength and weaknesses of R&I in each Member State. These analysis will be included in **the Country Reports** and will be the basis for the identification of economic challenges faced by the Member States and the issuing of **Country Specific Recommendations**. The regional dimension to build and strengthen national R&I ecosystems continued to be promoted through the reinforced **Knowledge Exchange Platform 2.0**, which is one of the core activities under the Joint Action Plan with the Committee of the Regions.

Following the negotiation of the new Cohesion Programming with the adoption of the Partnership Agreements and Operational Programmes, DG R&I was very active in analysing and making suggestions to align these programmes to EU R&I objectives, such as **EU Missions or Partnerships** or their contribution to a renewed European Research and Innovation Area or a New European Innovation Agenda.

Steps were also taken, throughout 2022, to create **synergies** between EU programmes to support the deployment of research and innovation results in the European economy. Two example were the preparations to make explicit reference to the **'100 Climate Neutral and Smart Cities Mission'** in the text of the call for proposals published under the Connecting Europe Facility (CEF) programme; and a workshop aimed at mature Horizon 2020 research and innovation projects capable of using the Innovation Fund for large scale deployment. These **'synergies by design'** increase the impact on the economy from results of research and innovation projects.

DG R&I worked with DG REGIO towards the adoption of a new Guidance document on **synergies** between Horizon Europe and the European Regional Development Fund programmes. In the relevant 2021-2027 legislation (Horizon Europe, Cohesion Policy, State Aid General Block Exemption Regulation), opportunities for creating synergies were greatly enhanced through harmonised rules and mirroring provisions. The objective is to mobilise under-exploited R&I potential across the Union, to improve access to excellence, reduce the innovation divide, to boost stronger R&I ecosystems and to succeed in the green and digital transition. The guidance document was published on 5 July 2022 together with **the New European Innovation Agenda**. With the new synergies' guidance, the Commission provides a

practical and user-friendly toolbox for Member States, regions, cohesion policy managing authorities and R&I stakeholders. In addition, in order to intensify the potential for synergies,

and following the recommendations from a study from the European Court of Auditors, the Commission has made the necessary administrative strides to bring together the R&I and Regional Policy authorities. These two communities will be part of a dedicated sub-group under the **ERA Forum** and will start its activities in early 2023. **The Seal of Excellence Community of Practice** equally organised regular meetings and responded to specific needs and requests to ensure that this instrument is widely used.

DG R&I continued to contribute to **the revision of State aid rules** relevant for Research and Development and Innovation (RDI). This included notably providing DG R&I's views and comments in the procedural framework of the Inter Service Consultations (ISCs) on the RDI Framework, adopted in October 2022, and **the General Block Exemption Regulation** specifically modified for the Green Deal and the Industrial and Digital Strategies. The revisions of these State aid rules proposed by DG COMP offer clarifications for the support of RDI including a.o., a new measure for public support for the construction and upgrade of testing and experimentation infrastructures, synergies of state aid with article 185 and 187 initiatives or other implementing bodies, or clarifications of applicability of aid measures for digital technologies and digitisation activities (e.g. super-computing, quantum technologies, block chain, artificial intelligence, cyber security, big data and cloud or edge computing).

The Horizon Europe Dissemination and Exploitation strategy will support the EU Missions and its stakeholders through the creation of portfolios of Horizon's results relevant for the Missions. These portfolios include results from FP7 and Horizon 2020 projects as well as additional MFF programmes when relevant (e.g. EMFF, LIFE, 3rd Health Programme) ⁽¹¹⁾. In parallel, contacts have been made with the **relevant EU Missions platforms** to establish synergies with the Horizon Results Platform. The portfolios were used to support the organisation of the **R&I Days**. Work will continue to increase the use of the portfolios as well as to identify new results from **Horizon Europe**.

DG R&I has delivered **the proposal for a Council Recommendation on the guiding principles** for Knowledge Valorisation that was adopted by the Council in December 2022. It introduces a new directionality moving from the traditional concept of knowledge transfer and intellectual property management to the valorisation of intellectual assets generated by different types of actors in a dynamic R&I ecosystem. To support the implementation of the Guiding Principles for knowledge valorisation, the DG engaged in a co-creation mode with stakeholders the development of **a Code of Practice for intellectual asset management and of a Code of Practice on standardisation**. Moreover, the DG expanded and improved the Knowledge Valorisation Platform that provides stakeholders a forum to share best practices, knowledge and expertise.

⁽¹¹⁾ The search methodology is a combination of text-mining technology (CORTEX) with domain knowledge provided by the Missions Secretariats and Executive Agencies. The IT tools developed by the CIC with the latest text mining technologies – Cortex - contributed to this support.

Some best practice **knowledge valorisation examples:**

DINA-ITC is a large training programme in Spain that aims to encourage engagement of the academic and research community in processes of knowledge valorisation with and towards various societal actors.

The **call for the best social/humanistic innovation (HUD) at the University of Ljubljana** aims to strengthen the valorisation of knowledge in the fields of social sciences, art and humanities. It contributes to the development of structured support services for the university's non-technological innovation.

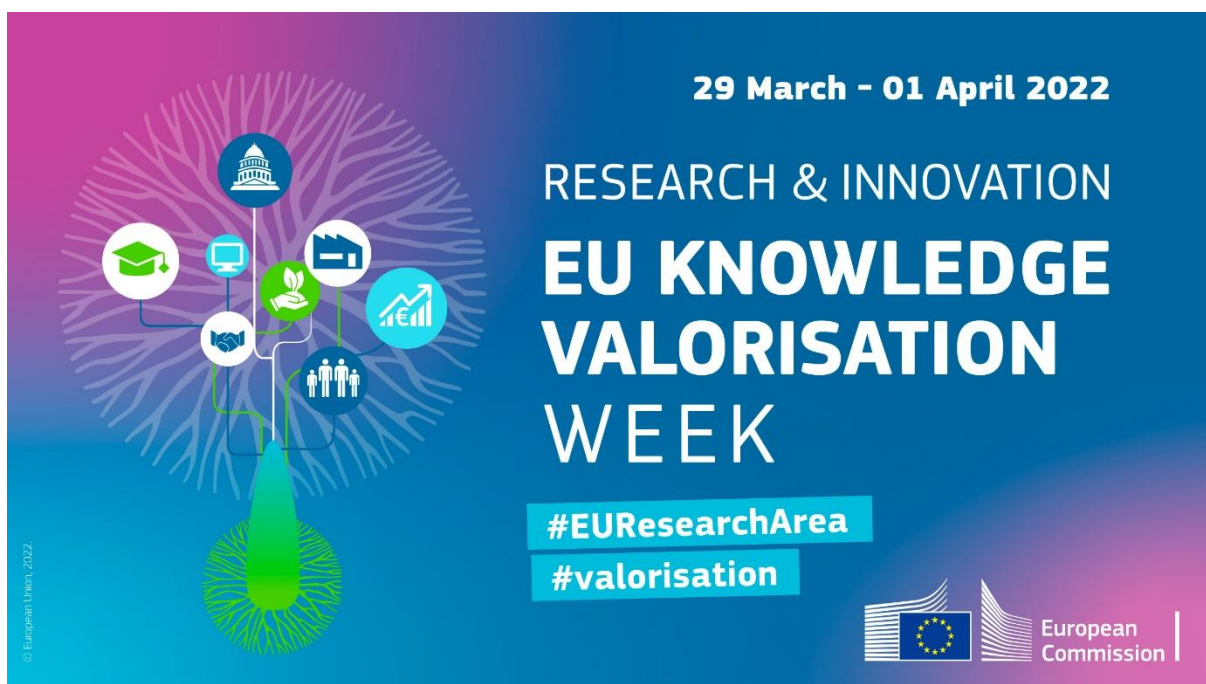
The EU Knowledge Valorisation Platform connects players in Europe with the ambition to turn research results into sustainable products and solutions for society. It promotes the exchange of experiences to enhance the capacities and skills of valorisation actors at all levels. The repository of good practices, which is filled by Member States and stakeholders

themselves, counts over 100 inspiring examples. The Platform supports co-creation with stakeholders by hosting communities of practice. It provides comprehensive and easy-to-understand information on the EU guiding principles and associated Codes of Practice and offers background articles and news on European valorisation policy.

In order to increase **communication and engagement** of the Member States and stakeholders on the guiding principles for Knowledge valorisation and the two upcoming codes of practice, the DG designed an awareness raising campaign that will intensify the message on the importance of knowledge valorisation in the Union and it will include a tour of the EU capitals with dedicated events. In the framework of the ERA, the DG organised **the second EU Knowledge Valorisation Week** (29 March – 1 April 2022), in cooperation with the EU Member States and EEA countries, that was opened **by Commissioner Mariya Gabriel**. The number of participants was doubled, and the range of topics and sharing formats was increased compared to the 2021 edition.

The 2022 edition of the **European Innovation Scoreboard** was published in September 2022 and provides comparative analysis of innovation performance in the EU and some neighbouring countries, associated countries and the main global competitors. To promote the recovery from the COVID-19 crisis and support sustainable and inclusive growth, targeted economic analyses were published with an objective to provide an evidence base for transformative R&I policies. In particular, the **2022 Science, Research and Innovation Performance report** published in July 2022¹¹ is a major analytical contribution.

¹¹ https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/science-research-and-innovation-performance-eu-2022-report_en



DG R&I has also been working on the development of actions to substitute pre-identified **critical raw materials and products** to avoid potential dependencies on other global players and the risks of bottlenecks in the supply chain. This is critical for the industry's green and digital transformation and the EU competitiveness in such areas as Artificial Intelligence, Big Data, Cloud, Cybersecurity, Industrial Biotech, Robotics or Microelectronics.

Furthermore, taking into account that the Cluster 4 'Digital, Industry and Space' part of the Horizon Europe 'main' work programme 2023-2024 **promotes explicitly human-centric approaches across its scope**, the DG has been working on the development of actions in the context of the manufacturing industry, or other human-centric and ethical approaches and the "Industry 5.0", a concept of industry working for people and the environment.

The Industry for the Future/Industry 5.0 Award is a recognition prize for EU-funded projects that advance **the Industry 5.0 vision** by presenting a convincing and inspiring solution, addressing Industry 5.0's three main pillars: sustainability, human-centricity and resilience, while also being clearly applicable in industry. Launched in January 2022, the award triggered a very strong response of more than 55 applications, which were thoroughly analysed and evaluated by a high-level Jury. At **the R&I Days in September 2022**, the first prize was awarded to the project RAMP-PV, which has developed a process to up-cycle **high quality raw materials** (such as silicon and silver) from industrially generated photo-voltaic waste.

The **European Partnership on Metrology** was officially launched in March 2022 as an article 185 initiative and it aims to support the transition towards a green, climate neutral and digital Europe, as well as to strengthen the resilience, competitiveness, and economic growth of the European industry. The Metrology Partnership is co-funded by the Member States, **via EURAMET** (the European Association of National Metrology Institutes and the European Union).

A Memorandum of Understanding between the European Commission and Eureka was signed on 22 June 2022. It sets the overall principles and areas of collaboration between the Commission and Eureka for the coming years, focusing on four areas of cooperation in relation to the support towards the European Innovative SMEs, the global cooperation in R&I, the cooperation in the context of the ERA pact and the cooperation in the context of the New European Innovation Agenda.

The second edition of **the Transition Performance Index** was published in March 2022 including a media package and Horizon magazine article. The DG also published the new European Research Area (ERA) **industrial technology roadmap for low-carbon technologies**, which provides a list of key emerging low-carbon technologies for energy-intensive industries and ways to leverage R&I investments to accelerate their development and uptake in energy-intensive industries.

Throughout 2022, DG R&I continued promoting the initiatives under the priority ‘An economy that works for the people’, through **many external communication activities** and supporting relevant policy initiatives. For instance, DG R&I has raised awareness of the policy objectives and demonstrate good practice for **“Industry 5.0”**.

General objective 4: A STRONGER EUROPE IN THE WORLD

The DG's contribution to the 'A STRONGER EUROPE IN THE WORLD' headline ambition is reflected by the following specific objective. The performance tables are included in the annexes on page 39:

- Specific objective 4.1: Regional research and innovation strategies and broader association policy contribute to promoting common European R&I values and creating a global Research and Innovation Space

DG R&I was mainly focused on the implementation of the **Communication on the Global Approach** to R&I on the international level during 2022. In this respect, the DG worked closely with **the French Presidency** in preparing a Ministerial conference, which took place in Marseille in March. Ministers supported **the Marseille Declaration**, which sets out the need to align on fundamental values and principles in international cooperation on R&I. The content of the declaration was also mirrored in Council Conclusions which confirmed the support of Ministers for the Commission to establish a **multilateral dialogue** with key international partners on these values and principles. This dialogue was launched by DG R&I in July 2022 with the participation of over 50 countries, and several international organisations and European stakeholder organisations. The dialogue is being implemented through workshops on a particular principle or value, aiming to discuss common terminology, share experience on practical implementation, and identify good practices.



Cooperation with Member States received special impetus with the launch of the **ERA Subgroup on the Global Approach** that agreed on its four priorities for cooperation: supporting the multilateral dialogue on R&I values and principles; European Science Diplomacy Agenda; Team Europe pilots on China and

Africa; and stronger collaboration in multilateral R&I platforms.

The DG coordinated the work on the use of **Article 22(5)** of Horizon Europe Regulation which, in order to protect the Union's strategic assets, interests, autonomy or security, restricts

participation in a limited number of topics. It further carried out an assessment of the eligibility of Associated Countries in such sensitive call topics.

Multilateral cooperation in the context of the **G7** under the German Presidency received special attention with a meeting of Science Ministers in June 2022 agreeing on a “Communiqué” strongly focused on the impact of **the Russian invasion of Ukraine** and the need to align on fundamental R&I values and principles. participated in the Science and Technology in Society (STS) Forum in Japan, to raise awareness on association to Horizon Europe, and pave the way for the next G7 R&I Ministerial which will be held under the Japanese Presidency.

Successful Joint Committee meetings have been held with the US, Canada, Argentina and China. In particular, cooperation with the **US** has been enhanced: the **EU-US** Joint Consultative Group under the bilateral science and technology cooperation agreement met for the first time in five years in October 2022. In addition, the DG has been co-leading the work stream on electro-mobility and interoperability with smart grids under the EU-US Trade and Technology Council Working Group 2 and coordinated **the Commissioner’s mission to Silicon Valley**, to present **the New European Innovation Agenda**. 2022 also marked the 10th year anniversary of **the International Rare Diseases Research Consortium (IRDiRC)** for which the DG took stock of IRDiRC’s achievements from medical professionals, researchers and people living with a rare disease on how valuable the work of the Consortium is. The videos have been promoted on Facebook, Twitter, and LinkedIn.

At the **African Union-EU (AU-EU)** High Level Policy Dialogue on STI (Science, Technology and Innovation) in January and the EU-AU Summit in February, the working version of the AU-EU Innovation Agenda aiming at translating research results into tangible products, services and jobs for Africa and Europe was very well received and a consultation was launched on the specific sectors of the agenda (public health; green transition; capacities for science; innovation and technology), including through a major stakeholder event in Nairobi. A Taskforce was set up with **South-Africa** to prepare the EU-RSA Joint Cooperation Committee, the Ministerial and a Joint S&T Cooperation Committee. At the **Union for the Mediterranean** R&I Ministerial in June, a political declaration on future cooperation including R&I Roadmaps in Health, Renewable Energy and Climate Change was adopted. Based on these dialogues, specific initiatives targeting cooperation with Africa and the Mediterranean were included in the 2023-2024 work programme.

With regard to the **Global Health EDCTP3 Joint Undertaking (GH EDCTP3)**, the Work Programme 2022 was successfully adopted, related calls for proposals launched, evaluated and results sent to applicants. It aims at accelerating the clinical development of new or improved health technologies for the identification, treatment and prevention of poverty-related and neglected infectious diseases, including (re-)emerging diseases in sub-Saharan Africa.



The EDCTP informed treatment guidelines and recommendations of the World Health Organization (WHO): The safety and effectiveness study of Pyramax for malaria treatment conducted by the EDCTP-supported West African Network for Clinical Trials of Antimalarial Drugs (WANECAM) and the Central African Network on Tuberculosis, HIV/AIDS and Malaria (CANTAM), generated the clinical evidence and data that supported the 2022 revision of the WHO malaria treatment guidelines. Inclusion in the latest version of the WHO guidelines for malaria is a key step towards broader use of the medicine.

Discussions with **India** on establishing a Trade and Technology Council were finalised with one of the working-groups focussing on R&I. DG R&I wrote the Terms of Reference of the Trade and Technology Council Working Group 2, on Green and Clean Energy Technologies, and helped prepare the file for Council agreement (Non-Binding Instrument procedure). In line with our nuanced approach with China, we continued the discussion on the Joint Roadmap for **EU-China** Cooperation in science, technology, and innovation. Progress was achieved on research-related framework conditions whereas there was little advancement on innovation-related framework conditions. This was reflected in the 2023-2024 Work Programme with the launching of two research cooperation flagships in areas of mutual interest, such as food, agriculture and biotechnology, and climate change and biodiversity and a restricted approach on innovation-related actions¹² In addition, to help mitigate **foreign interference** more generally, the DG started developing tools to help research organisations assess areas where it is in the EU's interest to engage with countries where further risk mitigation measures are needed.

DG R&I further strengthened **the association of third countries to Horizon Europe** in 2022. 16 countries in the *EU's neighbourhood* are now associated countries in the programme: **Albania, Armenia, Bosnia and Herzegovina, the Faroe Islands, Georgia,**

¹² Article 22.6 of Horizon Europe regulation

Iceland, Israel, Kosovo*, the Republic of Moldova, Montenegro, North Macedonia, Norway, Serbia, Tunisia, Türkiye and Ukraine. The DG has ensured continuity between Horizon 2020 and Horizon Europe with 15 of these partners and welcomed Kosovo joining for the first time. With the new association agreements coming into force, this allowed researchers and research entities from these countries to fully participate across the programme actions on similar terms as Member State entities. In addition, Joint R&I Committees under the new association agreements were established, with the first meetings convened with a majority of the countries. In line with DG R&I increased transparency commitments, all new association agreements have been published in the Official Journal (OJ L95).

As regards **Morocco**, all clauses of the association agreement were negotiated by DG R&I and became preliminary closed during the spring of 2022, with the exception of the territoriality clause, negotiated directly by the EEAS. **Egypt** has also shown an interest in association, and technical level discussions took place, but they would need to have a protocol to the Euro-Mediterranean Agreement in place on its participation in Union programmes first.

After the finalisation of the association negotiations with the **Faroe Islands** in autumn 2021, the agreement was signed on 24 May 2022 by the Council and provisionally applies since then, now awaiting the consent of the European Parliament to be concluded.

DG R&I coordinated with relevant DGs and agencies the implementation of contingency measures for calls impacted by the **UK's** late association.

As regards possible newcomer associated countries located beyond the EU's direct vicinity, exploratory talks were concluded with **New Zealand** in March, with **Canada** in April, and progressed well with **Japan**. For Canada and New Zealand, the Recommendations to open negotiations were adopted by the College, and then by the Council in September 2022. Negotiations with New Zealand were concluded in December 2022, paving the way for New Zealand's expected association to Pillar II of the programme in 2023. Signature of the agreement is expected in 2023, upon completion of the internal procedural steps on both sides. Negotiations with Canada started in December 2022, and are expected to be finalized in 2023, to allow its association. In relation to **Japan**, the DG prepared the Recommendations to open negotiations with Japan, in a view to launch this file once the Chief Negotiators have agreed to start with internal preparations of the negotiations.

After the submission of a Letter of Intent by **South Korea** in February 2022, the DG prepared the launch of exploratory talks in March. Technical discussions on the association possibility continued with other countries showing an interest in possible association, most notably **Singapore**.

* This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence.

Twelve **Joint R&I Committee meetings** under the new Horizon Europe association agreements were organised in 2022. They took stock of the implementation of the new agreements, discussed R&I policy developments, the country participation in the programme and in the ERA, and exchanged information on new legislations, decisions or national R&I programmes that are relevant for the implementation of the agreement.

The DG has also contributed to the file on the EU membership applications of **Georgia, Republic of Moldova and Ukraine** by preparing a questionnaire on the implementation of the EU acquis in Science and Research (Chapter 25), analysing the replies and preparing country reports assessing the ability of the countries to assume the obligations of an EU membership in the field of R&I.

Important progress was made **on the implementation of the Western Balkans (WB) Agenda** on Innovation, Research, Culture, Education, Youth and Sport. The Agenda is a comprehensive, long-term cooperation strategy for the EU and the WB's aiming to contribute to the economic development, regional cooperation, and strengthening the innovation capacity of the WBs partners. It further promotes scientific excellence and reforms of the region's education systems, creating further opportunities for youth, and helping prevent brain drain. The WB Ministerial event of 27-28 June 2022 in Tirana brought together 13 Ministers from the region, with key outcomes, directly linked to the deliverables of the WB Agenda.

The R&I dimension of **the Eastern Partnership (EaP)** aims at boosting the R&I capacities of EaP's partners by intensifying their integration with the EU R&I systems. DG R&I contributed to the implementation of the 2021 renewed agenda "Recovery, resilience and reform post-2020 Eastern Partnership (EaP) priorities" including the top Targets for the post 2020 EaP R&I cooperation. In October 2022, the DG organised in Tbilisi, Georgia, the fourth informal meeting at expert level within the EaP Panel on R&I, which took stock of the participation of the EaP countries in Horizon Europe and discussed the challenges in the implementation of the EaP post-2020 R&I priorities towards recovery, resilience and reforms, the progress in developing and implementing national plans and programmes, and their alignment with the ERA. The meeting also discussed the possibility of establishing Horizon Europe Offices in Georgia, Ukraine and Moldova.

The first **EU-Türkiye High-Level Dialogue on science, research, technology, and innovation** took place in Brussels on 15 November 2022. The dialogue focused on Green Deal aspects such as green industrial production, renewable energy, and climate-neutral and smart cities. Emphasis was also placed on the role of Union programmes in boosting human capital development, innovation and technology transfer.

RUSSIA'S WAR OF AGGRESSION AGAINST UKRAINE

Following **the Russian military invasion in Ukraine**, the Commission decided not to engage in further R&I cooperation with Russian entities. All actions related to Russia were

therefore terminated or put on-hold until further notice. DG R&I took action immediately **to stop the participation of Russian public entities in ongoing Horizon 2020 projects and future Horizon Europe projects**, and played a central role in putting in place specific provisions in the 5th package of sanctions to provide a legal basis for that. In total, 117 ongoing participations from Russian (public or public related) entities were terminated. Work continues to ensure full respect of the sanctions through an active monitoring of participation in Horizon Europe to ensure that organisations and/or individuals listed in the sanctions do not participate in any capacity.

DG R&I coordinates the Commission's support for Ukraine's R&I actors and ecosystem focusing on three key objectives. First, sustain scientific assets and activity in Ukraine and support Ukrainian researchers in Ukraine and in refuge, optimising Ukraine's association to Horizon Europe and Euratom and by implementing dedicated support initiatives. Second, in view of Ukraine's EU candidate country status, accelerate Ukraine's efforts towards EU integration in the area of R&I. Third, as political discussions on Ukraine's recovery are unfolding, advocate for the role of R&I in key political and operational frameworks. The DG also initiated the creation of a Horizon Europe Office in Ukraine (Kyiv) while organising a financial support for its establishment with a EUR 1.5 million grant to the National Research Foundation of Ukraine. The Office will promote funding opportunities and offer support in drafting proposals and finding partners in Europe. As such, it will complement the work of the EIC Ambassador in Ukraine appointed in September 2022 and that of the EU-funded Enterprise Europe Network-Ukraine. In addition, the EU-Ukraine Agreement on Science and Technology Cooperation, signed in 2002, was renewed in 2022, making it effective for a period of five years from 8 November 2019.

General objective 5: PROMOTING OUR EUROPEAN WAY OF LIFE

The DG's contribution to the 'Promoting our European way of life' headline ambition is reflected by the following specific objectives. The performance tables are included in the annexes on page 45:

- Specific objective 5.1: Research and Innovation develop and deploy solutions, technologies and innovations to tackle emerging threats and improve crisis preparedness
- Specific objective 5.2: Research and innovation support the European health initiatives, including the European plan to fight cancer

A notable example on health and care is the **U-PGx project**, which has **delivered the innovative "DNA medication pass"**, a tool with information linking a patient's genetic profile to medicines which are processed differently by individuals with different genetic variants. U-PGx showed a **30% reduction in adverse drug reactions when tailoring drug prescriptions to the patient's DNA traits**, demonstrating the utility of an individualised pharmacogenomics system for disease treatment.

In 2022 R&I continued to support the EU's recovery and resilience. DG R&I contributed to **HERA, the Health Emergency Preparedness and Response Authority**, defining together with the EU Member States three specific, high impact health threats categories for preparedness and response: pathogens with high pandemic potential, chemical/biological/radiological/nuclear (CBRN) threats and antimicrobial resistance (AMR). In preparation to the **Pandemic Preparedness Partnership**, a Coordination and Support Action was established with funding from Horizon Europe, and kicked off its work in September 2022.

For the **co-funded Partnership on Transforming Health and Care**¹³, preparations of the first Joint Transnational Call, the partnership governance and the launch of the partnership have run in parallel. In autumn 2022 the Grant Agreement was finalised and signed by 57 partners representing 24 Member States and Associated Countries.

In November 2022, the Group of Chief Scientific Advisors (GCSA) handed over to Commissioners Gabriel and Lenarčič a scientific opinion entitled "**Strategic crisis management in the EU**", providing advice on how the EU can approach crisis management in a more strategic manner, so to prepare for the complex crises of the future. On the same occasion, the European Group on Ethics in Science and New Technologies (EGE) issued a **Statement on Values in Times of Crisis**, highlighting how values influence our understanding and response to crisis, and how the instruments for crisis management are chosen.

To maximise uptake of research results, specific exploitation obligations were introduced for all the Covid-19 emergency call for proposals along with the 2020 **EU Covid-19 Manifesto**.

¹³ The co-funded Partnership on Transforming Health and Care will inform necessary reforms and lay the ground for the transition towards more sustainable, resilient, innovative and high quality people-centred health and care systems.

The **Manifesto for EU COVID-19 Research** has been extended until end of December 2022 to keep mobilising relevant research results in the fight against the pandemic. So far, more than 660 organisations (including universities, research institutes and private companies) and close to 1900 individuals endorsed the Manifesto from all over Europe and beyond. One of the guiding principle of the Manifesto is to make COVID-19 research data available through the **European COVID-19 Data Platform**. Since its launch in April 2020, the **European COVID-19 Data Platform** has been reinforced and currently hosts more than 14 million records of diverse data types, including over 6,0 million raw viral sequences and over 6,5 million viral genomes. The platform has sparked intense international collaboration, and this is crystallised in the number of National COVID-19 Data Portals developed in the EU and outside the EU. In addition, the platform is being repurposed and already accepting monkeypox viral data, illustrating that it can become a blueprint for other pathogens and diseases.



EUROPEAN HEALTH DATA SPACE (EHDS)

Following the adoption of a Commission proposal for a Regulation on the European Health Data Space (EHDS) in May 2022, DG R&I launched in October the project EHDS2 pilot, funded by the EU4Health programme. Aim of the project is to develop an IT pilot infrastructure for the secondary use (reuse) of health data and assess its scalability towards a Union-wide infrastructure, as a core component of the EHDS.

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In the first half of 2022 the **1+ Million Genomes initiative (1+MG)** implemented a proof-of-concept (PoC) for the technical requirements of the 1+MG infrastructure based on the use case of rare diseases (RD). At the end of 2022 the 1+MG technical infrastructure proof-of-concept for cancer was developed. In November 2022, the project Genomic Data Infrastructure (GDI), co-funded under the Digital Europe programme, was launched marking the start of the scale-up and sustainability phase of the 1+MG initiative. Moreover, the potential for synergies with the upcoming EHDS pilot is significant, and the possibility to connect and integrate EHDS and 1+MG is being actively explored.

The Solve-RD project successfully implemented a systematic European data sharing and collaborative analysis infrastructure to jointly re-analyse genomic and phenotypic data with advanced AI analysis from unsolved cases of patients that have received genetic screening with inconclusive results in their hospitals. The consortium pooled together >15000 unsolved rare diseases and managed to solve 10% of the submitted unsolved cases, with massive re-analysis of genome data alone, in a scale never achieved before. Following its successful results, the Solve-RD diagnostic pipeline is envisioned to be up scaled through the future co-funded partnership on rare diseases with the aim **of providing diagnosis to undiagnosed rare disease cases** within 6 months after the patient comes into medical attention.

The **Innovative Health Initiative Joint Undertaking (IHI JU¹⁴)** took over the rights and obligations of IMI2 JU, with a stronger focus on cross-sectoral projects involving not only the pharmaceutical sector but also biotechnology, medical technologies, vaccines and digital health. IHI will support among others the **Pharmaceutical Strategy for Europe** and the **Europe's Beating Cancer Plan**. The first calls for proposals were adopted and published

in June 2022, and a third one was launched in December 2022.

The Mission part of the Horizon Europe 'main' work programme 2021-2022 for the **Cancer Mission¹⁵** was amended a second time in May to include research & innovation actions for 2022. Between 2021-2022, a total of 235M EUR have been made available through the Mission part of the Horizon Europe 'main' work programmes, to support 30 R&I projects and the development of flagship initiatives in the areas of (1) understanding, (2) prevention, including screening and early detection, (3) diagnosis and treatment, and (4) quality of life, taking also into account transversal priorities, such as addressing inequalities and childhood cancer. Lastly, using a portfolio approach two project clusters, "Understanding" and "Prevention", were set up in 2022 to engage coordinators in building synergies among projects, and conducting joint activities to maximise impact. The Mission part of the Horizon Europe 'main' work programme 2023 was published in December 2022.

¹⁴ Established in November 2021, IHI is designed to build on what worked well in IMI, addressing the lessons learnt, and leverage the benefits of cross-sectoral collaboration in research and innovation to better respond to current and emerging health needs

¹⁵ The Mission on cancer has the explicit goal of working with Europe's Beating Cancer Plan to improve the lives of more than 3 million people by 2030 through prevention, cure and solutions to live longer and better

Flagship initiatives of the Mission on Cancer:

1. In September 2022, the Coordination and Support Action **Understand CANcer (4.UNCAN.eu)** started to develop a blueprint of the future UNCAN.eu research data platform, which will combine research, health and any other relevant data at an unprecedented scale to better understand the development of cancer;

2. A study was commissioned, which will deliver in 2023 a **blueprint for the future European Cancer Patient Digital Centre**, addressing the feasibility, utility and sustainability of such a virtual centre;

3. In synergy with Europe's Beating Cancer Plan, a network of **Comprehensive Cancer Infrastructures (CCIs)** will be developed. In 2022 a EUR 10 million grant was awarded to strengthen the research capacities of CCIs.

Preparatory work continued for the organisation of the thematic workshops¹⁶ and the conference on **"Addressing the needs of young cancer survivors"**¹⁷, bringing together young cancer patients and survivors, caregivers, policy makers and researchers to discuss this pressing issue. In March 2022, the Group of Chief Scientific Advisors (GCSA) published its scientific opinion on **"Cancer screening in Europe"**, which provided scientific advice to policy on considering the extension of cancer screening beyond breast, colorectal and cervical cancer to include prostate, lung and gastric cancer. The recommendations were taken up in the work of the Commission proposal for an update of the 2003 Council Recommendation on cancer screening. The final updated Council recommendations were published 9 December 2022.

Launched in 2022, the new co-funded European Partnership **PIANOFORTE**, with a budget of €30 million, will provide a scientific and technological basis for a

robust system of radiation protection. It will also innovate in ionising radiation based medical applications combating cancer and other diseases, developing new diagnostic and therapeutic approaches.

The EU-funded UPRIGHT project **developed school-based interventions to enhance resilience capacities in teenagers** (for example through effective coping skills, social emotional learning, mindfulness) and their families (positive parenting skills), as well as for teachers. Research under the UPRIGHT project led to the development of **manuals and supporting materials on the interventions, available in several languages** and on a web platform. The interventions have also been published on the School Education Gateway, as part of the European Toolkit for Schools, a collection of resources and initiatives that promote inclusive education and tackle early school leaving. Furthermore, in Denmark, the **UPRIGHT interventions have been included in the Master Program of Positive Psychology** at the Danish School of Education of Aarhus University.

At the ERA Forum DG R&I together with DG EMPL, presented a proposal for a new ERA action, aiming to develop a **Strategic Research and Innovation Agenda (SRIA) for the future of work**, by the end of 2023. The action's main objective is to identify how R&I can help analyse ongoing economic/societal transformations and inform policymaking relevant to the future of work, with a view to creating safe, decent and quality jobs and support workers in transition. DG R&I launched a series of internal and external workshops with experts on the future of work, which will provide initial input for the action, as well as for the publication of a preliminary report on R&I for the future of work begin 2023.

¹⁶ Workshops to be held on 11-12 January and 6 February 2023

¹⁷ Conference on "Addressing the needs of young cancer survivors" to be held on 7 February 2023

Innovative cultural and creative industries (CCIs): The CCIs represents a large and growing part of Europe's value and job creation and simultaneously contribute decisively to shape our cultures, perceptions and beliefs – as well as to our well-being and social cohesion. Previous R&I projects point both to the importance of the CCIs as well as to their fragility and need of support. Cluster 2 of the Horizon Europe 'main' work programme acts on these findings and supports the development of a culture and creativity driven European innovation ecosystem to foster European and regional growth and competitiveness.

DG R&I contributed to the Commission Communication on a **European strategy for universities** (January 2022) for the research and innovation dimension of higher education sector. The Communication led to Council Conclusions in April 2022. An important objective of the strategy is to strengthen the European dimension in higher education and research, currently piloted through the European Universities initiative from Erasmus+, which receives complementary support from Horizon.



**European strategy
for universities**

For the R&I dimension of the European strategy for universities, several links were made to the European Research Area (ERA) policy and process, such as regarding values, skills and competences, careers, open science, digitization, knowledge valorisation, research infrastructures, diversity and gender equality, international leadership.

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General objective 6: A NEW PUSH FOR EUROPEAN DEMOCRACY

The DG’s contribution to the ‘A NEW PUSH FOR EUROPEAN DEMOCRACY’ headline ambition is reflected by the following specific objectives. The performance tables are included in the annexes on page 48:

- Specific objective 6.1: European research and innovation support citizens’ involvement, social inclusion and equalities in Europe, including through communication of the European research and innovation added value

DG R&I makes a significant contribution to support **citizens’ involvement, social inclusion and equalities in Europe**.

Identifying and implementing tools for citizen engagement in the context of the EU Missions has also been a specific point of attention. A **citizen engagement event** took place on 1st December 2022 (with DG COMM) in the framework of the follow-up to the Conference on the Future of Europe to **launch the preparatory co-design work for the Horizon Europe Strategic Plan 2025-2027**. To ensure that R&I policy is forward-looking, the foresight community was mobilised through the newly introduced Future4Europe platform¹⁸ to further elaborate existing foresight work on the implications of the Russian aggression against Ukraine.

For instance on the **Conference on the Future of Europe**, in September 2021, the Commission launched a series of 27 **citizens’ panels** – one per MS – **on the climate transition**¹⁹. These participatory workshops – with a representative sample of a total of 800 participants – have provided input on what would make a just climate transition²⁰. The results of these events were uploaded to the online platform of the **Conference on the Future of Europe**, representing one of the major DG R&I inputs to this process. The citizens’ input was presented as joint input with the Climate Pact’s Peer Parliaments, at an event with Executive Vice-President Frans Timmermans on 29 April, with the report **“Shaping the EU’s Climate Transition: Citizens take the floor”** a major contribution of DGR&I to the CoFE.²¹ An

¹⁸ <https://www.futures4europe.org/challenges>

¹⁹ This project was kicked off in September 2021 with the goal of elaborating an EU roadmap for the climate transition with the active participation of citizens. The roadmap itself will be drafted by selected experts, but the actions to elaborate the roadmap will gather input from citizens, civil society, research and education communities as well as national authorities through a series of engagement events across the 27 Member States

²⁰ The groups of citizens in each country deliberated on three key areas for the climate transition: sustainable food production, smart and sustainable mobility, and energy-efficient buildings. For each theme, we gathered citizens’ recommendations and the trade-offs they would or would not be willing to undertake in order to ensure a just transition.

²¹ See report “Shaping the climate transition: Citizens take the floor” (April 2022): https://ec.europa.eu/info/news/shaping-eus-climate-transition-citizens-take-floor-2022-apr-29_en

expert-drafted roadmap for the climate transition, building on this citizens' input and on policy roundtables with stakeholders, will be delivered in January 2023.

In addition, the projects working on deliberative democracy were presented on a factsheet showcasing the contribution of EU-funded R&I to make participatory and deliberative democracy work.²² . This resulted in numerous references to R&I policy and actions in the Staff Working Document “Final evaluation of the Active and Assisted Living Research and Development Programme” that accompanied the Commission Communication on the Conference on the Future of Europe²³ .

In 2022, **Gender Equality** activities focussed on the implementation of the new provisions for gender equality in both Horizon Europe and the new ERA, ensuring wide outreach on the new **gender equality plan (GEPs) eligibility criterion for Horizon Europe**.

The Horizon 2020 funded **GENDERACTION project** (April 2017-Sept. 2021) contributed significantly to capacity building on gender equality in R&I among national authorities representatives and Horizon 2020 National Contact Points, Building on its success, the **GENDERACTIONplus project**, funded under Horizon Europe, kicked-off in June 2022 with an enlarged consortium (26 beneficiaries and 14 associated partners, from 21 Member States and 3 Associated Countries, representing ministries as well as national research funding bodies) and with a particular focus on intersectionality, gender-based violence, and involving research funders, in line with the new ERA Policy Agenda 2022-2024 objectives.

. The Czech Presidency has organised on 24-25 November 2022 a conference entitled ‘*Ending Gender-Based Violence: Towards gender equal, safe and inclusive research and higher education*’ and launched a Call for Action to end gender-based violence in academia which directly support ERA Action 5’s deliverable on a ‘Strategy to counteract gender-based violence including sexual harassment in the European R&I system and to assure gender equality in working environments through institutional change in any research funding or performing organisation’.

The Horizon 2020 project **UniSAFE** aims to support higher education, research organisations and policymakers in eradicating gender-based violence in the European academic and research area. **UniSAFE** has conducted a baseline mapping of countries with laws and policies addressing gender-based violence in universities and research organisations, and based on this, produced an interactive map, highlighting a fragmented picture, in which 16 of the 33 mapped countries have relevant legal acts and/or policy frameworks that were issued by a national authority in the period of 2015 and May 2021. It has developed the largest European survey to date on gender-based violence in academia and presented their results at the Czech Presidency conference on *Ending Gender-Based Violence in Academia*.

In line with the ambitions of the new ERA Communication and the ERA Policy Agenda 2022-2024 Action 5 to support the development of inclusive gender equality plans and policies, a **factsheet**²⁴ was published in May, featuring emerging practices and examples from national R&I organisations to advance the inclusion of socially disadvantaged groups, such as ethnic

²² <https://op.europa.eu/en/publication-detail/-/publication/15d4d244-ede7-11ec-a534-01aa75ed71a1/language-en/format-PDF/source-259619192>

²³ COM(2022)404 final

²⁴ <https://op.europa.eu/en/publication-detail/-/publication/8527a556-e543-11ec-a534-01aa75ed71a1/language-en>

minorities, disabled persons and LGBTIQ persons in R&I organisations. The publication of the full report on 'Approaches to inclusive gender equality in R&I' followed in September.²⁵

In addition the **Equality in R&I matrix** enlarged its focus to address broader equality aspects in line with the Commission's commitment to mainstream equality. A new RTD-EAC joint initiative, in line with the European Strategy for Universities communication, addresses the underrepresentation of women in STEM fields through a roadmap of activities, which includes a **manifesto** from STE(A)M-oriented universities **on gender-inclusive STE(A)M education**. Together with DG EAC, RTD launched a **survey** between October – November to consult stakeholders on the objectives and scope of the manifesto, and organised a **participatory workshop** in December to co-design the basic principles for addressing the women's underrepresentation in STEM.

On International women's day, a roundtable event was organised with Commissioner Gabriel, EP president Roberta Metsola and other prominent women, featured in the #EUWomen4future social media campaign. In line with 2022 being the European Year of Youth, the campaign #SHEU LEADS aimed to inspire the young generation.



In the framework of the **European Year of Youth activities**, DG R&I launched the Bioeconomy Youth Ambassadors, the Youth Ambassador programme of the All-Atlantic Ocean Research Alliance linking with Youth Ambassadors of the Mediterranean and Black Sea basins, the Plastic Pirates Initiative, and the contribution to the European Climate Solidarity Corps activities.

The Directorate-General continued to support beneficiaries in their **dissemination and exploitation** endeavours, helping beneficiaries to progress further with their results, both at

²⁵ <https://op.europa.eu/en/publication-detail/-/publication/006a43e7-3eda-11ed-92ed-01aa75ed71a1/language-en/format-PDF/source-search>

an early stage of development or close to market through specific services (**Horizon Results Platform, Horizon Results Booster, networking solutions**).

Are citizens becoming opposed to the idea of European Union? Research by the **RECONNECT** project suggests the answer is no. In fact, based on their extensive citizen surveys and media analysis, the opposite is true: rather than becoming disillusioned, citizens want to turn their frustration into action, and are looking for ways to reconnect with the EU.

RECONNECT took a very active role in the **Conference on the Future of Europe**, not only by academic and dissemination efforts but also by providing expertise to some of its citizens' panels, and organising CoFE events e.g. on "Citizen Participation in Democratic Europe".

General objective 7: A MODERN, HIGH PERFORMING AND SUSTAINABLE EUROPEAN COMMISSION

The DG's contribution to the 'A modern, high performing and sustainable European Commission' headline ambition is reflected by the following specific objective. The performance tables are included in the annexes on page 50:

- Specific objective 7.1: The Common Implementation Centre and Common Policy and Centre provide user-friendly services and tools to the European Commission for effective and efficient planning, programming and implementation of the Research and Innovation Framework Programme and other EU programmes

In 2022, **DG R&I, through the Common Policy Centre (CPC)**, prepared the amendment of the **'main' work programme 2021-2022** implementing the Specific Programme of **Horizon Europe** that was adopted as foreseen in Q2 of 2022.

In parallel, the CPC led the preparation of the **'main' work programme 2023-24**, which was adopted in Q4 2022, with around EUR 13.5 billion to support researchers and innovators in Europe to pursue breakthrough solutions for environmental, energy, digital and geopolitical challenges and continued facilitating **the co-creation** within the Commission, the **co-design** with other EU institutions and external stakeholders of the **Horizon Europe strategic plan 2025-2027**. The preparatory work was based on a gap analysis, a citizens' engagement event, a large stakeholder consultation, as well as through a dedicated broad foresight exercise. In particular the **"Public consultation on the past, present and future of the European Research & Innovation Framework programmes 2014-2027"** was launched on 1st December and remains open for 12 weeks until 23 February 2023. It covered the Horizon Europe Strategic Plan 2025-2027 priorities, but also the ex-post evaluation of Horizon 2020 and the interim evaluation of Horizon Europe.



The preparation of the co-created work programmes included the development and update of **the Handbook for Horizon Europe Work Programme preparation**, and making trainings and training materials available to colleagues involved in work programme drafting.

The preparation of the work programmes also included the budgetary aspects. In this context, the CPC played an active role in co-creating and defending a **Draft Budget 2023** commensurate with the level of ambition set by the legal acts, the Strategic Plan and the Work Programmes, while ensuring an appropriate level of administrative expenditure. It ensured that all legal requirements are respected (maximum 5% of the budget goes to administrative expenditure, 10% of pillar II goes to missions, etc.). It steered three **comprehensive budget revision exercises**. The CPC also took the necessary measures to reach an optimal **budget implementation**.

The CPC provided appropriate timely **solutions and support for the financing of new Commission priorities**: Chips Act, European Health Data Space, Space connectivity, Deep Tech valley, Hydrogen valleys, financing the Mutual Insurance Mechanism, extension of the Cities mission for Ukraine and other ad hoc budgetary issues such as the increased budget for Cluster 3 part of the Horizon Europe 'main' work programme 2023-2024.

The drafting of the **analysis document underlying the Strategic Plan** made good progress in 2022. The **citizen engagement event on 1st December 2022** (with DG COMM) gathered around 70 citizens from **the Conference on the Future of Europe** to discuss the Strategic Plan with Commission experts. A dedicated **foresight project** was launched involving context scenario analyses and analyses of potential disruptions, broad dialogue and engagement with Member States, stakeholders and the public that will culminate into vision building and recommendations for Horizon Europe.

In the framework of the **preparations of the ex-post evaluation of Horizon 2020** (due end 2023), the **ex-post evaluation study on the pilot phase of the European innovation Council (EIC)** under Horizon 2020 was concluded and published in Q2-2022, containing recommendations that are being taken into account in adapting the functioning of the EIC. Eight other evaluation studies are still on-going, with three horizontal studies having been finalised, and five impact studies at draft final phase.

The operationalisation of the short-term indicators of the Horizon Europe monitoring framework (along Key Impact Pathways) made good progress in 2022 and visuals for those

indicators are being integrated into the Horizon Dashboard (still in a pre-production phase, i.e. not yet publicly visible). The Annual Report on Research and Technological Development Activities of the European Union and Monitoring of Horizon Europe in 2021 was adopted in August, as planned. As it is the case with previous such reports, monitoring data for Horizon Europe calls have been included in the report.

DG R&I, through the Common Implementation Centre (CIC) continued to put in place the **Horizon Europe (HE) implementation framework** needed for an efficient application of the programme.

It continued to provide substantial **legal support** to policy making, such as association policy to Horizon Europe, international cooperation, intellectual property rights, ethics and research integrity and on inter-institutional matters. It has replied to more than 1000 legal questions received through the different channels of consultation of the Common Legal Support Service's Helpdesk, completed, published and gradually updated the Horizon Europe **General Model Grant Agreement** and the EIC Accelerator Contract (actual-costs based), based on the new corporate Model Grant Agreement as well as continued to work together with the horizontal services on the drafting of further annotations for **the (corporate) Annotated Grant Agreement**, including the Horizon Europe specifics aiming at providing guidance to applicants and beneficiaries when applying for EU funding.



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The CIC worked intensively on the rollout of **lump sum funding** and on a unit cost scheme for personnel costs, and it continued its intensive information and training campaign about lump sums. Several large online events and staff trainings were run. In addition, the CIC published the “Lump sum quick guide” to explain the approach in plain language and released a dedicated lump sum page on the F&T Portal that bundles all available guidance, information, and events in one place.

The CIC has adopted, in close collaboration with DG BUDG, the Commission Implementing decision (EU) 2022/219 establishing rules of procedure for the review, pursuant to Article 22(1) of Regulation (EC) No 58/2003, of the legality of acts of executive agencies. These rules of procedure aim to streamline the procedure for legality review of acts of executive agencies by the Commission services, ensuring consistency and clarity to accelerate the assessment of the requests, while remaining fully compliant with the legal requirements found in Article 22 of Regulation (EC) No 58/2003. It has also:

- treated 11 European Ombudsman (EO) cases, acting either for DG R&I or other research family members
- contributed and cooperated with the Legal Service (LS) in relation to four new court cases out of nine active ones registered at the Court of Justice of the European Union, initiated by beneficiaries of research funds following their participation in R&I framework programmes (FP7 or H2020).
- Treated 35 “Article 22” requests (Complaints against acts adopted by Executive Agencies: Article 22 of Council Regulation (EC) No 58/2003).
- Handled 103 requests for access to documents, contributed to other 26 handled by other DGs and Executive Agencies and to 3 requests for contribution from the Council under the Memoranda of Understanding

In terms of support to the functioning of the Executive Agencies, the CIC finalised the templates for **the Memoranda of Understanding** between agencies and parent DGs (general provisions and provisions on Horizon Europe), following several rounds of consultations and negotiations.

The CIC has offered **trainings for participants and staff**. In particular, organising, for the first time in 2022, two “Coordinators’ Days” for HE participants, as well as offering training sessions for staff on HE Grant Agreement Preparation and HE reporting. The CIC also regularly organised webinars on avoiding errors in declaring personnel costs in Horizon 2020 grants.

The CIC continued to lead **the corporate IT suite for grant management (eGrants, including the eExperts application)**, ensured smooth operation and continuous enhancement of **the Funding and Tenders Portal** and made important contributions to corporate projects such as **eProcurement and Compass Corporate** (for the digitalisation of workflows). The eGrants IT tools and the portal are moving from 28 Commission programmes under the MFF 2014-20 to 69 programmes under the MFF 2021-27. In 2022, the CIC continued to adapt eGrants and **the Funding and Tenders Portal** to the needs of Horizon Europe and the MFF 2021-2027. **The eExperts tools** continued to be reengineered as a future-proof platform, to support further functional and technical evolutions. The on-boarding of new organisations and new programmes is also an on-going activity which continued in 2022. Furthermore, it has made further progress on the activities on the required **IT support for reporting and monitoring of HE Partnerships**.

The CIC decide to launch **the Client-Centric Initiative** with the aim to let the services of the CIC evolve, and make the Funding and Tenders Portal even more client-centric – for

applicants, beneficiaries, experts, NCPs, policy makers, investors, media, citizens and other stakeholders. The goal is to enable a smoother real-time engagement with clients and stakeholders with better relevance and matching of content with the users' interests. So far, a general survey has been published to which 2620 users responded. Analysis is underway.

Examples of the EU added value

- When internet routers fail, the consequences are wide-ranging. **The EU-funded SafeNet project²⁶** has released the first publicly available open-source tool to detect and fix router bugs. This together with commercial software to optimise data centre networks are helping to protect the communications infrastructure European citizens rely on.
- The bio-based economy will bring new sustainable job opportunities for citizens across Europe. However, some regions have little experience or knowledge of how to transition away from fossil fuels. **The EU-funded POWER4BIO project²⁷** is helping to share best practices and provide guidance, to ensure no region in Europe is left behind.
- The capacity of lightweight materials to reduce the transportation sector's carbon footprint could be erased if their production isn't efficient too. That's why **the EU-funded RECOTRANS project²⁸** has developed a state-of-the-art process to manufacture composite components for cars, trains and trucks. Innovations such as these will help the EU reach its climate goals, securing a healthy environment for all citizens.

²⁶ [Tools to protect and optimise Europe's internet communications | Research and Innovation \(europa.eu\)](#)

²⁷ [Catalysing the green chemistry industry across Europe | Research and Innovation \(europa.eu\)](#)

²⁸ [Harder, better, faster, stronger: cleaner composites for greener cars | Research and Innovation \(europa.eu\)](#)

2. MODERN AND EFFICIENT ADMINISTRATION AND INTERNAL CONTROL

This section explains how DG R&I delivered the achievements described in the previous section. It is divided into two subsections.

The first subsection (2.1) reports on the control results and other relevant information that supports management's assurance on the achievement of the **financial management and internal control** objectives²⁹. It includes any information necessary to establish that the available evidence is reliable, complete and comprehensive. It covers all activities, programmes and management modes relevant to the DG.

The second subsection (2.2) deals with the other components of a **modern and efficient administration: human resources, better regulation principles, information management and external communication**.

DG RESEARCH AND INNOVATION AND THE RESEARCH AND INNOVATION FAMILY

The control framework presented in this report should be seen in the overall context of the responsibilities of DG R&I in implementing Horizon Europe (HE), Horizon 2020 (H2020), Euratom and finalising the implementation of the Seventh Framework Programme (FP7).

Management modes for the programmes' implementation

The responsibility for implementing the EU Framework Programmes for Research and Innovation is shared among different Directorates-General in the Commission. In order to focus on core institutional policy tasks, these Directorates-General have delegated substantial parts (for DG R&I, the major part) of the programme implementation to Executive Agencies, Joint Undertakings (also called Article 187 bodies) and public-public partnerships with the Member States (also called Article 185 bodies). The multitude of actors involved in the implementation of the EU Framework Programmes for Research and Innovation is referred to as the '**Research and Innovation Family**' (R&I Family).

The 2021's transfer of the last Horizon 2020 programme activities of DG R&I to the Executive Agencies allowed the transformation of the DG into a policy-oriented DG.

DG R&I coordinates the Research and Innovation Family

DG Research and Innovation, as the lead DG of the R&I Family, invests considerable resources in coordinating the management of Horizon 2020 and Horizon Europe by the members of the family, well beyond its own budget appropriations. In addition to its coordination activities

²⁹ Art 36.2 FR: a) effectiveness, efficiency and economy of operations; b) reliability of reporting; c) safeguarding of assets and information; d) prevention, detection, correction and follow-up of fraud and irregularities; and e) adequate management of risks relating to the legality and regularity of underlying transactions

within the family, the DG, as parent DG of the R&I Executive Agencies, monitors and supervises³⁰ their activities. DG R&I is the lead parent DG of REA, ERCEA and EISMEA.

With the current Multiannual Financial Framework (2021-2027), the Horizon Europe programme, and its Governance and Operating Rules were adopted. A joint Executive Committee and Steering Board for the Common Implementation Centre (CIC) and the Common Policy Centre (CPC) were established.

Annex 7 presents the Horizon 2020 and Horizon Europe implementation model and the key role of the Common Implementation Centre and the Common Policy Centre in simplifying, harmonising and supporting the underlying business processes.

³⁰ Supervision of Executive Agencies is described in section 5 of Annex 7

2.1. Financial management and internal control

Assurance is provided on the basis of an objective examination of evidence of the effectiveness of risk management, control and governance processes.

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

- the reports submitted by the Directors (including monitoring of Joint Undertakings and Public-Public Partnerships) and by AOSDs where applicable;
- the draft Activity Report from the Common Implementation Centre ("CIC") to all research related implementing bodies;
- the reports from Authorising Officers in other DGs managing budget appropriations in cross-delegation;
- the reports on control results from entrusted entities in direct management (Executive Agencies) as well as the results of the DG's supervisory controls on the activities of these bodies;
- the contribution by the Director in charge of Internal Control and Risk Management, including the results of internal control monitoring at DG level;
- the reports on recorded exceptions, non-compliance events and any cases of 'confirmation of instructions' (Art 93.2 FR);
- the synthesis of the Common Audit Service ex-post audit results;
- conclusion of the Internal Auditor on the state of internal control in DG Research and Innovation and observations and recommendations reported by the Internal Audit Service (IAS);
- the observations and the recommendations reported by the European Court of Auditors (ECA).

The systematic analysis of the available evidence provides sufficient guarantees as to the completeness and reliability of the information reported and results in the full coverage of the budget delegated to the Director-General of DG Research and Innovation.

This section covers the control results and other relevant elements that support management's assurance. It is structured into 2.1.1 Control results, 2.1.2 Audit observations and recommendations, 2.1.3 Effectiveness of internal control systems, and resulting in 2.1.4 Conclusions on the assurance.

2.1.1. Control results

This section reports and assesses the elements identified by management which support the assurance on the achievement of the internal control objectives (ICO) ⁽³¹⁾. The DG's assurance building and materiality criteria are outlined in Annex 5 of the annual activity report. The annual activity report Annex 6 outlines the main risks together with the control processes to mitigate them and the indicators used to measure the performance of the relevant control systems.

Direct management concerns grants given to beneficiaries through the implementation of the EU Framework Programmes (Seventh Framework Programme, Horizon 2020, Euratom and Horizon Europe) as well as subsidies paid to Executive Agencies.

Indirect management concerns subsidies to grant-implementing entrusted entities: Joint Undertakings (Article 187 bodies), Public-Public Partnerships (Article 185 bodies) as well as financial instruments provided by the European Investment Bank and the European Investment Fund.

In 2022, indirect management accounted for 67% of payments and direct management for the remaining 33%. As in 2021, DG Research and Innovation's main budget management mode for the year was indirect management.

Both direct and indirect grant management³², together with financial instruments, accounted for about 90% of the DG R&I's payments in 2022.

The other expenditures relate mainly to public procurement (5%) and mutual insurance mechanism (3%).

⁽³¹⁾ 1) Effectiveness, efficiency and economy of operations; 2) reliability of reporting; 3) safeguarding of assets and information; 4) prevention, detection, correction and follow-up of fraud and irregularities; and 5) 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 36.2). The 2nd and/or 3rd Internal Control Objective(s) (ICO) only when applicable, given the DG's activities.

³² Including payments to Executive Agencies

Table 1: Overview of the budget implemented in 2022 by DG Research and Innovation broken down by the different control systems under which the payments were authorised^{33 34}

Control system	(M €)	%	Cumulative (in %)
Subsidies to grant implementing entrusted entities: Joint Undertakings (article 187 bodies) and Public Public Partnership (article 185 bodies)	812,28	50,85%	50,85%
Financial Instruments (InnovFin)	261,50	16,37%	67,22%
Executive Agencies	203,25	12,72%	79,94%
Grants	167,16	10,46%	90,40%
Procurement	81,28	5,09%	95,49%
Mutual Insurance Mechanism	50,41	3,16%	98,65%
Other	15,04	0,94%	99,59%
Prizes	5,37	0,34%	99,93%
Experts	1,19	0,07%	100,00%
Grand Total (M €)	1.597,48	100%	

³³ EDCTP3 Joint Undertaking was not autonomous in 2022. Expenditure related to this JU is detailed in Annex 11.

³⁴ Payments for EUR 40 976 have been authorised under cross sub-delegation by PMO in 2022 and are reported under the control system "Other". The reports on the cross sub-delegations received from PMO and from other services reporting (having only commitments cross-subdelegated) did not provide indication of any particular unfavourable observation with regard to the regularity and legality of the transactions concerned.

In line with the 2018 Financial Regulation, DG Research and Innovation's assessment for the new reporting requirement is as follows:

- DG Research and Innovation had no cases of '**confirmation of instructions**'³⁵ in 2022.
- In Horizon 2020, there are no cases of financing not linked to costs (Financial Regulation Article 125.3). In Horizon Europe, there is, so far, **one case of financing not linked to costs**: it concerns the 'Women TechEU' actions granted by the European Innovation Council and SME Executive Agency (EISMEA), where the amount of financing not linked to costs for each grant is fixed at EUR 75 000³⁶.
- There were no cases **of flat rates > 7% for indirect costs in 2022**³⁷. According to the Horizon 2020 and Horizon Europe Rules for Participation³⁸, indirect eligible costs are determined by applying a flat rate of 25% of the total direct eligible costs³⁹.
- Three grant agreements signed in 2022 **derogated from the principle of non-retroactivity** pursuant to Article 193 of the Financial Regulation. In such cases, however, no costs were incurred prior to the date of submission of the grant application are eligible.

There are no Financial Framework with duration of more than four years⁴⁰ that entered into force during the reporting year 2022.

³⁵ FR art 92.3

³⁶ See RAO decision from DG R&I of 7 July 2021 available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he-womentecheu_en.pdf

³⁷ FR Article 181.6

³⁸ Article 29 of 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 Article 39 Regulation (EU) 2021/65 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination.

³⁹ See additional information in Annex 7

⁴⁰ FR art 130.4

2.1.1.1. Effectiveness of controls

This section describes the effectiveness of the control system for the main expenditure items, i.e., direct and indirect grant management⁴¹. The effectiveness of the control systems assessed is based on (i) legality and regularity of transactions, (ii) fraud prevention, protection and detection measures and (iii) other control objectives, namely safeguarding of assets and information and reliability of reporting.

A) Legality and regularity of the transactions

DG Research and Innovation uses internal control processes to ensure sound management of risks relating to the legality and regularity of the underlying transactions it is responsible for, taking into account the multiannual character of programmes and the nature of the payments concerned.

a. Ex-post control results for grant management

Since the Seventh Framework Programme (FP7), the R&I Family has adopted a common audit strategy intended to contribute to the legality and regularity of expenditure on a multi-annual basis, including detection and correction of non-systemic and systemic errors.

For Horizon 2020, the Common Audit Service (CAS) of the Common Implementation Centre carries out all audits, including those concerning grants concluded by the Executive Agencies and the Joint Undertakings. This is a major step towards ensuring a harmonised approach, legal certainty, equality of treatment of beneficiaries and minimising the audit burden on beneficiaries.

The Horizon Europe Audit Strategy, which is currently under preparation, will be based on the achievements and lessons learnt from Horizon 2020 and it will be risk based.

The **main indicators** on legality and regularity⁴² of EU Framework Programmes for Research and Innovation are:

- **Cumulative representative detected error rate**, based on errors detected by ex-post audits on a Common Representative Sample of cost claims across the R&I Family.
- **Cumulative residual error rate**, which is the extrapolated level of error after corrective measures have been implemented by the Commission services following the audits, accumulated on a multi-annual basis.

The **targets** set for this control system are respectively:

- For Horizon 2020, to ensure that the cumulative residual error rate remains within a

⁴¹ For the other expenditure items, unless indicated, the assessed level of legality and regularity is found in the section “Estimated risk at closure”.

⁴² These indicators are described in point 1.1 of Annex 5

range of 2-5 %, aiming to be as close as possible to 2%. Progress against Horizon 2020 targets is assessed annually based on the results of the implementation of the ex-post audit strategy and taking into account the frequency and importance of the detected errors along with cost-benefit considerations regarding the effort and resources needed to detect and correct the errors.

- For FP7 and Horizon Europe, to ensure that cumulative detected and residual error rates do not exceed 2%⁴³.

It should be noted, however, that due to its multi-annual nature, the effectiveness of the control strategy of the R&I Family can only be measured and assessed fully in the final stages of the EU Framework Programme, once the ex-post audit strategy has been fully implemented, and errors, including those of a systemic nature, have been detected and corrected.

Despite objective challenges due to carry-over from the COVID-19 pandemic, the foreseen audit target was achieved. The CAS managed to finalise audits on 633 participations corresponding to 103.6% of the planned most probable scenario for the 2022 target⁴⁴.

Seventh Framework Programme

The audit strategy for the Seventh Framework Programme was considered to be fully implemented in 2020⁴⁵. Due to the 'de minimis' threshold for financial reservations introduced in 2019⁴⁶, a quantified reservation is not required in 2022 for the Seventh Framework Programme for Research and Innovation⁴⁷.

Horizon 2020 Framework Programme

In 2020, the Commission refined its methodology for calculating the Horizon 2020 error rates in line with the European Court of Auditors' observations in its 2018 and 2019 Annual Reports. The methodology applied is described in Annex 5 'Materiality criteria'. Since January

⁴³ No representative error rate for Horizon Europe will be available in 2022 and 2023 as the ex-post audit campaign for the Programme is planned to be launched by the end of 2023, at the earliest.

⁴⁴ Given the uncertainties related to the evolution of the COVID-19 pandemic and related carry over, the CAS developed two scenarios for the closure of audit targets.

⁴⁵ See section on Seventh Framework Programme in AAR 2021 (Representative detected error rate : 5.44% and Cumulative residual error rate: 3.47% for DG Research and Innovation)

⁴⁶ Agreement of the Corporate Management Board of 30/4/2019.

⁴⁷ In 2019, a 'de minimis' threshold for financial reservations was introduced stipulating that quantified Annual Activity Report reservations related to residual error rates above the 2% materiality threshold are deemed not substantial for segments representing less than 5% of a DG's total payments and with a financial impact below EUR 5 million. As is the case for the Seventh Framework Programme expenditure, a quantified reservation is not required. FP7 payments represent 0.2% of 2022 DG R&I payments and financial impact is below the materiality threshold.

2020, DG R&I applied the revised methodology on a sample of 1 937 audit conclusions. This results in the following error rates for Horizon 2020⁴⁸ on 31 December 2022:

- Cumulative representative detected error rate: **2.71%**⁴⁹
- Cumulative residual error rate for the Research and Innovation Family DGs: **1.67%** (1.71 % for DG Research and Innovation⁵⁰).

In 2022, DG R&I's cumulative residual error rate for Horizon 2020 is calculated at 1.71%, which is below the materiality threshold. However, the root causes of errors have been identified and targeted actions taken to address any identified weaknesses.

Since Horizon 2020 is a multi-annual programme, the error rates, and the residual error rate in particular, should be considered within a time perspective. Specifically, the cleaning effect of audits will tend to increase the difference between the representative detected error rate and the cumulative residual error rate, with the latter finishing at a lower value.

These error rates are calculated on the basis of the audit results available when drafting the Annual Activity Report. They should be treated with caution as they may change subject to the availability of additional data from audit results.

Given the results of the audit campaign, and the observations made by the European Court of Auditors in its Annual Reports, the Common Implementation Centre, in close cooperation with central Commission services, defined actions aimed at significantly simplifying the rules, and paving the way for a significant reduction of the error rate in Horizon Europe. In addition to the use of a Corporate Model Grant Agreement and a common Annotated Grant Agreement for all programmes directly managed by the Commission, other actions being implemented include further simplification (such as the increased use of simplified forms of funding, including lump sums and unit costs), focused communication campaigns to more "error-prone" types of beneficiaries with higher than average error rates (such as SMEs and newcomers), and enhanced training to external audit firms performing audits on behalf of the Commission. The last three measures also target Horizon 2020 grants and beneficiaries. Focusing on the most common errors, these actions will be straightforward and achieve higher impact⁵¹.

⁴⁸ The Horizon 2020 audit campaign started in 2016. At this stage, four Common Representative Samples with a total of 628 expected results have been selected. By the end of 2022, cost claims amounting to EUR 40.8 billion have been submitted by the beneficiaries to the services. The audit coverage for Horizon 2020 is presented in Annex 7. In addition to the Common Representative Samples, Common Risk Samples and Additional Samples have also been selected. The audits of 4 060 participations were finalised by 31/12/2022 (of which 633 in 2022).

⁴⁹ Based on the 479 representative results out of the 628 expected in the four Common Representative Samples.

⁵⁰ It should be noted that in 2021 most of Horizon 2020 grants managed by DG R&I were transferred to Executive Agencies. Hence, this figure is based only on the actions that remained with DG R&I.

⁵¹ Further information on the implementation of the action plans established to reduce the error rates of Horizon 2020 and Horizon Europe can be found in Annex 7, Section 10.

In addition, the ECA recommended certain improvements related to the quality of the audit process. Following the recommendation of the ECA the Commission reinforced or introduced a number of actions to remedy the risks identified by the ECA. The Court has acknowledged all these efforts to improve the quality of audits and considers its recommendation to be fully implemented.

Horizon Europe Framework Programme

2022 was the second year of implementation of the Horizon Europe Framework Programme. No representative error rate for Horizon Europe is available in 2022 as the ex-post audit campaign for the Programme is planned to be launched by the end of 2023, at the earliest, once a meaningful number of payments can be audited. Consequently, without elements allowing an assessment of the level of errors and taking into account the simplifications introduced for Horizon Europe that aim to reduce the error rate, the detected and residual error rate will be estimated to 2%⁵² for DG R&I.

Euratom Framework Programmes

The Euratom Regulation⁵³ complements the Horizon 2020 Regulation. The Euratom Audit Strategy is articulated as a complement to the one of Horizon 2020. For the Euratom Programme, the 2022 cumulative detected error rate is 1.35%. However, in the AAR 2022, only the Horizon 2020 error rate has been presented and used for the estimation of the amount at risk as the Euratom error rate is not statistically representative.

The estimation of the Euratom Horizon Europe error rate will be aligned with the one of Horizon Europe. The Audit Strategy for the Euratom Horizon Europe Programme⁵⁴ is currently under preparation and it will be based on the achievements and lessons learnt from the Horizon 2020 Euratom Audit Strategy.

b. Control results for Executive Agencies, Joint Undertakings, Public-Public Partnerships

Supervision arrangements

The supervision for all entrusted entities includes participation in Steering Committees or Governing Boards, the regular reporting and the examination of reports from audit services such as the Internal Audit Service and the European Court of Auditors. For further information on supervision arrangements for entrusted bodies see Annex 11 for Joint Undertakings (Article 187 bodies) and Public-Public Partnerships (Article 185 bodies), and Annex 7 for

⁵² These rates correspond to the objective set for Horizon Europe.

⁵³ Council Regulation (Euratom) No 1314/2013 of 16 December 2013 on the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 Framework Programme for Research and Innovation (OJ 347/84, 20.12.2013)

⁵⁴ Council Regulation (Euratom) 2021/765 complementing the Horizon Europe Regulation

Executives Agencies. For the Joint Undertakings, a note⁵⁵ describing the roles and responsibilities of the EC services concerned in the establishment of the Commission position in the Governing Board has been finalised in 2022.

Control results for Executive Agencies

In 2022, DG Research and Innovation was the lead parent DG of the Research Executive Agency (REA), the European Research Council Executive Agency (ERCEA) and the European Innovation Council and SME Executive Agency (EISMEA). DG Research and Innovation is also a parent DG of the European Health and Digital Executive Agency (HADEA) and of the European Climate, Infrastructure and Environment Executive Agency (CINEA), as these two agencies implement parts of Horizon 2020 and Horizon Europe.

In 2022, DG Research and Innovation paid EUR 203.25 million to the REA, ERCEA and EISMEA to cover their administrative expenses.

In 2022, a new framework of supervision for the Executive Agencies was prepared by the central DGs (DG BUDG, SecGen and DG HR) and is part of the new guidelines on Executives Agencies⁵⁶. This framework of supervision is reflected in the Memoranda of Understanding (general provisions) concluded between the Agencies and their parent-DGs.

The Memorandum of Understanding related to the management of Horizon Europe (specific provisions) has been concluded for all Executive Agencies implementing Horizon Europe, except for EISMEA, which is planned to be finalised in April 2023. Furthermore, most of the operations related to the implementation of Horizon Europe are performed through the corporate eGrant, which benefits from specific central instructions and guidance⁵⁷.

DG Research and Innovation effectively supervised the three Executive Agencies for which it is lead parent DG. For REA and ERCEA, no issues warranting a mention in this report were identified. This is not the case for EISMEA, and DG R&I has issued a reservation in its Annual Activity Report, following the criticality of the IAS report on the design and early implementation of the EIC, received at the end of January 2023.

The deficiencies identified in this IAS audit report have been taken into account in the assessment of DG R&I internal control system (see section 2.1.3) and major IAS recommendations are detailed in Annex 7. The related joint Action Plan for all recommendations has been prepared in coordination with EISMEA and DG CNECT, and finalised in February. The need to restructure the EIC Fund following the provisions of the Horizon Europe legislation led to significant delays in the implementation of the EIC Accelerator scheme, with operational consequences for the beneficiaries as individual investment decisions and payments had to be put on hold, and a reputational damage for

⁵⁵ Note on mutual expectations between Commission services regarding the supervision of the Joint Undertakings under Horizon Europe - Ares(2022)7421731

⁵⁶ C(2022) 9328 final

⁵⁷ eGrant Vademecum

the Commission. However, the Commission is progressively absorbing the backlog of investment decisions. In parallel, an interim solution has been put in place⁵⁸ while finalising the negotiations with the European Investment Bank for the implementation of the indirect management mode, expected to be concluded in 2023.

In its role supervising EISMEA, DG R&I has requested it, amongst others, to 1) demonstrate that, for year 2022, all reporting obligations of the EIC Fund stipulated in the statutory and governing documents of the EIC Fund have been performed timely; 2) report on the conclusions of the review of the reports with due date 15 February 2023 ; 3) demonstrate that adequate supervision and control arrangements are in place for the EIC Fund; 4) assess and report on the 2022 administrative budget of the EIC Fund, including an analysis of the comparison between budget and actual costs, ensuring its compliance with the relevant thresholds defined in the EIC work programme. On the basis on EISMEA's assessment of the received reports/deliverables for the year 2022 to date, and conclusions in EISMEA's 2022 AAR, reasonable assurance on the sound financial management of the EIC Fund has been provided.

Furthermore, a critical risk related to European Innovation Council (EIC) has been identified by DG R&I and EISMEA⁵⁹ for year 2023, the risk that the EIC (notably the EIC Fund) is not implemented in full compliance with the basic act and with the instrument of delegation to EISMEA.

Control results for Joint Undertakings (Article 187 bodies)

The Joint Undertakings Circular Bio-Based Europe (CBE), Clean Aviation (CA), Clean Hydrogen (CH), Global Health European & Developing Countries Clinical Trials Partnership (EDCTP3)⁶⁰ and Innovative Health Initiative (IHI) implement parts of the Horizon 2020 and Horizon Europe Framework Programmes, under the governance and oversight of DG R&I⁶¹.

In 2022, these Joint Undertakings received from DG Research and Innovation a total of EUR 629.36 million of payments for operational and running costs.

The Joint Undertakings are fully integrated into the Common Implementation Centre's structures and apply the same audit strategy as the Commission services.

The Joint Undertakings' 2022 Annual Activity Reports are under preparation. At this stage, DG R&I identified no particular issue warranting a mention in this report.

⁵⁸ Commission Decision C(2022) 6818 of 28 September 2022

⁵⁹ EIC Fund budget has been delegated to EISMEA as from April 2021

⁶⁰ A new joint undertaking, the Global Health EDCTP3 (EDCTP3 JU) was established through Council Regulation 2021/2085 (SBA). DG R&I is responsible for the initial operations until it becomes autonomous, which is foreseen for the second semester of 2023. Only one grant has been signed in 2022, not allowing a proper control results to report so far.

⁶¹ Annex 10 of this report summarises the underlying legal and financial parameters of the Joint Undertakings' operations.

The Court of Auditors gave a positive opinion on the 2021 Accounts of all the Joint Undertakings under DG Research and Innovation's governance. All of them had a residual error rate below 2%.

Control results for Public-Public Partnerships (Article 185 bodies)

Article 185 of the Treaty enables the EU to participate in research programmes undertaken jointly by several Member States, including participation in structures created for the execution of national programmes. The bodies supported under Article 185 in 2022 are the following: Research for the benefit of SMEs (EUROSTARS2), European Partnership on Metrology⁶², European and Developing Countries Clinical Trial Partnership (EDCTP2), Joint Baltic Sea Research Programme (BONUS) and Partnership for Research and Innovation in the Mediterranean Area (PRIMA).

In 2022, DG Research and Innovation paid a total of EUR 180.12 million to Art.185 bodies for operational and running costs⁶³.

Following the review of the reports submitted⁶⁴, no significant weakness affecting the DG's annual declaration of assurance for 2022 has been identified.

c. Control results for financial instruments – INNOVFIN (EU Finance for Innovators)

In 2022, DG Research and Innovation transferred a total of EUR 261.50 million to the European Investment Bank (EIB) and the European Investment Fund (EIF) for InnovFin-EU Finance for innovators. InnovFin is a joint initiative launched by the European Investment Bank Group (EIB and EIF) in cooperation with the European Commission under Horizon 2020. It aims at utilising specific financial instruments to accelerate access to finance by innovative businesses and other innovative entities in Europe.

The principles and details regarding the supervision of the budget entrusted to the EIB and EIF for InnovFin were established in 2015 along with the respective internal control system aiming to ensure that the achievement of operational objectives was based on sound financial management. This Supervision Strategy was revised in January 2023. The principles are presented in Annex 7. For the period 2021-27 InnovFin is a legacy financial instrument and has been replaced by InvestEU.

The following 2022 annual reports have been timely received and are under review for the three instruments (EIB Loans, EIF SME Guarantee (SMEG) and EIF InnovFin equity (IFE)):

- management declaration of assurance annexed to the financial statements in the form defined in the Financial and Administrative Framework Agreement,

⁶² European Partnership on Metrology which is the Horizon Europe successor of European Metrology Programme for Innovation and Research (EMPIR) took over the activity of EMPIR end 2021.

⁶³ Annex 11 details on the respective legal bases and the amounts entrusted to each body.

⁶⁴ PRIMA's AAR 2022 will be submitted in April 2023.

- summary report on audits and controls carried out in the period in question, including an analysis of the nature and extent of errors and identified weaknesses in systems if any, and any corrective actions taken or planned,
- independent audit opinion on the management declaration and the summary report on audits and controls.

So far, there are no particular issues that would need to be addressed in DG R&I annual activity report.

For the 2022 audited financial statements of all three instruments⁶⁵, confirmation has been received that no matter potentially damaging the financial interest of the Union has been identified.

The EIF SME Guarantee (SMEG) annual reporting package 2021 (mentioned in the AAR 2021 as pending) was received in May 2022 and its review showed no particular issues that would need to be addressed in DG R&I AAR 2022.

The 2022 audited Financial Statements for RSFF (legacy from FP7) have been timely received. However, the Annual Reports will be received at a later stage.

Considering the values of the relevant indicators contributing to the objective of enhancing access to risk finance for investing in research and innovation (Industrial leadership), the performance of InnovFin exceeded expectations. More specifically, based on the latest data provided by the entrusted entities, the total volume of investments mobilized via debt financing and venture capital investments since the launching of the programme reached EUR 55.1 billion against a target of EUR 15 billion at the designing phase of the programme. The cumulative number of funded organisations reached 40 651 against a target of 5 000. Finally, the total amount of leveraged private funds reached EUR 35 billion against a target of EUR 35 billion.

d. Benefit of controls

DG Research and Innovation has in place an effective mechanism for correcting errors, through ex-ante and ex-post controls, resulting in preventive and corrective measures, respectively. The benefit at ex ante level control amounts to EUR 0.6 million, whilst recoveries and financial corrections following the results of ex post controls amounted to EUR 4.8 million.

⁶⁵ Including the report from the auditor and the report on factual findings resulting from the Agreed Upon Procedures engagement.

	Preventive Measures (m EUR)	Corrective measures (m EUR)
Implemented by the Commission		
<i>of which from Member States controls</i>	Not Applicable	Not Applicable
<i>of which from EU controls</i>	0,60	4,8
DG Research and Innovation Total	0,60	4,8

e. Estimated overall risk at closure

Based on all the above, DG Research and Innovation's presents in the following Table X an estimation of the risk at payment and risk at closure for the expenditure managed during the reporting year:

Table X : Estimated risk at payment and at closure (amounts in EUR million)

DG RTD	Payments made (2022,MEUR)	Relevant expenditure (for 2022,MEUR)	Detected error rate or equivalent estimates	Estimated risk at payment (2022,MEUR)	Adjusted Average Recoveries and Corrections	Estimated future corrections [and deductions] (for 2022,MEUR)	Estimated risk at Closure (2022,MEU R)
-1	-2	-5	-6	-7	-8	-9	-10
Grants FP7	0,87	1,22	5,44%	0,07	1,97%	0,02	0,04
Grants Horizon 2020 and Euratom Horizon 2020	55,12	168,67	2,71%	4,57	1,00%	1,69	2,88
Grants Horizon Europe and Euratom Horizon Europe	111,16	56,37	2,00%	1,13	0,00%	0,00	1,13
Subsidies to article 187 and 185 bodies FP7	2,81	2,81	2,00%	0,06	0,00%	0,00	0,06
Subsidies to article 187 and 185 bodies H2020	534,17	477,69	2,71%	12,95	1,04%	4,97	7,98
Subsidies to article 187 and 185 bodies HE	275,31	0,13	2,00%	0,00	0,00%	0,00	0,00
Financial instruments H2020 (InnovFin)	261,50	261,50	0,50%	1,31	0,00%	0,00	1,31
Procurement	81,28	81,23	0,50%	0,41	0,00%	0,00	0,41
Mutual Insurance mechanism	50,41	50,41	0,50%	0,25	0,00%	0,00	0,25
Prizes	5,37	5,37	0,50%	0,03	0,00%	0,00	0,03
Experts contracts	1,19	1,19	0,50%	0,01	0,00%	0,00	0,01
Other	13,26	12,67	0,50%	0,06	0,00%	0,00	0,06
Other	1,79	0,00	0,50%	0,00	0,00%	0,00	0,00
Total without contribution to EA's operating budget	1 394,23	1 119,25		20,83	0,60%	6,68	14,15
			Overall risk at payment in %	1,86%		Overall risk at closure in %	1,26%
				(7) / (5)			(10) / (5)
REA	98,41	88,03	0,50%	0,44	0,00%	0,00	0,44
ERCEA	58,81	54,97	0,50%	0,27	0,00%	0,00	0,27
EISMEA	46,03	28,51	0,50%	0,14	0,00%	0,00	0,14
Sub-total contributions (if more than one)	203,25	171,51		0,86		0,00	0,86
Total DG (with contributions to EAs)	1 597,48	1 290,75					

The full detailed version of table X is provided in annex 9.

The **estimated overall risk at payment** for 2022 expenditure (EUR 20.83 million) is the AOD's best conservative estimate of the amount of relevant expenditure during the year, not in conformity with the contractual and regulatory provisions applicable at the time the payment was made. This expenditure will subsequently be subject to ex-post controls and a proportion of the underlying errors will be detected and corrected in subsequent years. This amount corresponds to the conservatively **estimated future corrections** for 2022 expenditure (EUR 6.68 million).

The difference between those two amounts results in the estimated overall **risk at closure** (EUR 14.15 million) which is close to 2021 risk at closure (EUR 13.98 million).

For an overview at Commission level, the estimated overall risk at payment, estimated future corrections and risk at closure are consolidated in the AMPR.

f. Conclusion

DG Research and Innovation's portfolio includes segments with a relatively low error rate and segments with a higher error rate. The low error rate segments are the Horizon 2020 financial instruments, public procurements, the Mutual Insurance Mechanism, prizes and experts with inherent low-risk profile of funding modalities. The high error rate segment concerns only grants. The relatively high level of error in Horizon 2020 grants is linked to the applicable funding model, which is based on the reimbursement of eligible actual costs. Most of the errors relate to incorrect claims for personnel costs that are mainly due to beneficiaries' lack of thorough understanding of the inherently complex rules. Newcomers and Small and Medium Enterprises (SMEs) are more prone to errors in comparison to more experienced beneficiaries. There is evidence that the simplifications introduced under Horizon 2020, along with the ever-increasing experience, help in reducing the number of errors made by the beneficiaries, especially when compared to the Seventh Framework Programme. Notwithstanding these efforts, beneficiaries still make errors. Actions carried out to address these weaknesses are reported in the section "Results of the Horizon 2020 ex-post audits" and include focused communication campaigns to the more error-prone types of beneficiaries, and enhanced training to project and financial officers and external auditors.

B. Fraud prevention, detection and correction

The Common Anti-Fraud Strategy in the R&I Family (RAFS 2019), updated in June 2019, jointly with its Action Plan, sets out broad principles to counter external fraud in grant expenditure in Research & Innovation (R&I) Programmes by building relevant preventive and detective measures. Such principles remain valid to date. The Common Audit Service (CAS) coordinates and monitors the Common Anti-Fraud Strategy in the R&I Family. The R&I Family Fraud Risk Assessment was updated in 2022 as work preceding the 2023 update of the Common Anti-Fraud Strategy.

The second main fraud prevention action of 2022 was the drafting and adoption of the "Guidance on HE ex ante anti-fraud checks" which is part of the HE ex-ante control strategy.

Awareness raising actions on anti-fraud measures in the Commission were also maintained and targeted the HE Legal & Financial National Contact Points (NCP).

The FAIR Committee, chaired by the CAS, remains the main forum of the R&I Family on anti-fraud matters. In 2022, the FAIR Committee met 2 times. The first meeting was dedicated to the discussion of the updated R&I Family Fraud Risk Assessment and the Guidance on HE ex ante anti-fraud checks in view of their endorsement. The second meeting focused on the presentation and discussion of anonymised fraud cases and a reflection on the lessons learnt.

The CAS continues to actively cooperate with the European Anti-Fraud Office (OLAF) on fraud prevention, case selections and investigations, and coordinates within DG R&I the OLAF financial and administrative monitoring exercises. When other R&I family services were concerned by the implementation, coordination meetings were organised by the CAS, ensuring a harmonised approach to the implementation of OLAF recommendations. The CAS also continues to cooperate with the European Public Prosecutor's Office, when necessary.

By the end of 2022, 58.3% of the financial recommendations (issued in 2018-2022) have been fully implemented (14 cases), 37.5% have not been implemented yet (9 cases) and 4.5% of the cases are still under analysis (1 case).

The 37.5% not fully implemented are related to ongoing judicial proceedings, contestations of the amounts to be recovered (representing 5 cases not yet implemented), or waivers suggested by Legal Service and /or DG BUDG not yet completed by the AOD (4 cases).

DG R&I also contributed to the Commission Anti-Fraud Strategy mainly through the further development of eGrants and through the publication of the contracted experts on the Funding and Tender Portal.

In 2022, DG R&I has also updated its Anti-fraud Strategy (DG R&I AFS), which covers all spending areas except grants (i.e., fraud risks related to financial instruments, procurement, expert management, and prizes). The Action Plan against internal fraud focuses on raising staff awareness on the rules of ethics, with particular emphasis on possible conflicts of interest in the DG. Its implementation is being monitored and reported to the management twice a year. All necessary actions have been implemented. The results achieved during the year thanks to the anti-fraud measures in place can be summarised as follows:

- All newcomer attended the Welcome sessions and were made aware of the importance of Ethics in their duties.
- DG R&I staff received communication related to ethical aspects, and 55 members of R&I staff attended the Ethics trainings.

Based on the above information, DG Research and Innovation has reasonable assurance that the anti-fraud measures in place are effective overall.

C. Assets and information, reliability of reporting

Assets and information:

DG Research and Innovation's main assets, liabilities⁶⁶ and off-balance sheets⁶⁷ relate to items managed and controlled in the context of financial instruments (InnovFin), which are detailed in the table below:

	Amount in EUR million
Financial instruments: Available for Sale Investments	3.110,05
Available for Sale Financial Assets liquidable during the year	204,68
Current accounts and other liquidities < 3 months	150,95
Current financial liabilities	- 429,91
Guarantees given for financial instruments	- 2.740,39

Intangible assets are IT software, which represented EUR 44.91 million at the end of 2022. No security incidents with significant impact on the confidentiality, integrity or availability of Information Systems, were reported during the year.

Reliability of reporting and accounting

The findings and recommendations of the DG BUDG reports on the validation of Local Systems are subject to a systematic follow up by DG Research and Innovation. The DG had no open recommendations in 2022.

DG Research and Innovation implements a significant part of its budget through indirect management. It, therefore, relies on the reports and accounts provided by the relevant implementing bodies and considers that, overall, the reporting received is reliable and adequate for drawing assurance conclusions.

2.1.1.2. Efficiency of controls

Based on an assessment of the most relevant efficiency control results, DG Research and Innovation has assessed the efficiency of the control system and reached a positive conclusion. For the EIC Fund, the need to restructure led to significant delays in the implementation of the investment component. Since October 2022, the backlog of investment decisions is progressively absorbed.

Grant management

This section presents the main efficiency performance indicators for the activities carried out in DG Research and Innovation for Horizon 2020, Horizon Europe including Euratom namely

⁶⁶ Source of data : Table 4 in Annex 3 reports on DG R&I's overall assets.

⁶⁷ Source of data : Table 5 BIS in Annex 3 reports on off balance sheet

Time-to-Inform (TTI), Time-to-Grant (TTG) and Time-to-Pay (TTP). Some additional indicators on ex-post audits are presented in Annex 7.

After the delegation of activities to Executive Agencies in 2021, 145 Horizon 2020 signed grant agreements⁶⁸ remained under the responsibility of DG Research and Innovation, out of which 60 were completed and closed by the end of 2022. For the entire programme, around one out of eight proposals was retained for funding with the success rate standing at 11.95% (the respective success rate for FP7 was 18.53%⁶⁹). The total number of signed grant agreements under Horizon 2020 was 37 265 for the entire research and innovation family.

By the end of 2022, 5 509 Horizon Europe grant agreements (10 of which in DG R&I) and 2 Framework Agreements had been signed for a total EU contribution of EUR 16.28 billion (EUR 56.11 million of which in DG Research and Innovation). Although still in its early stages, Horizon Europe currently enjoys a success rate of 15.85%, i.e., a little over 1 in 6 retained for funding. Finally, 32 Euratom grant agreements were signed with an EU contribution of EUR 666.12 million.

Time-to-Inform (TTI)

For the period covering 2014-2022, the TTI for the Horizon 2020 grants signed in DG R&I was, on average, 102.8 days and under 153 days for 94.7% of the main-listed proposals.

Table 3a: Horizon 2020 Time-to-Inform

Period	DG Research and Innovation		Research and Innovation family	
	Signed Grant Agreements where TTI <= 153 days	Average TTI for main-listed proposals (days)	Signed Grant Agreements where TTI <= 153 days	Average TTI for main-listed proposals (days)
2014-2022	94.7%	102.8	98.27%	112

During 2022, 100% of the DG Research and Innovation Horizon Europe main-listed proposals received the information letters within five months (153 calendar days) from the respective call deadline. On average, information letters for all main-listed proposals were sent within 57 days.

Table 3b: Horizon Europe Time-to-Inform

Period	DG Research and Innovation		Research and Innovation family	
	Signed Grant Agreements where TTI <= 153 days	Average TTI for main-listed proposals (days)	Signed Grant Agreements where TTI <= 153 days	Average TTI for main-listed proposals (days)
2021-2022	100%	54	64%	131
2022	100%	57	63.5%	132

⁶⁸ With a total EU contribution of EUR 1.31 billion

⁶⁹ Dashboard dataset of 13/02/2023 – consulted on 13/02/2023

In 2022, 31 Euratom Horizon Europe grants were signed in DG Research and Innovation. The information letters were sent, on average, 137 days after the deadline of the respective call, which was within the deadline of 153 days for 30 grants (96.77%). For the period 2021-2022 and for the 32 signed grant agreements, the average TTI was 135 days with 97% within the target period.

Time-to-Grant (TTG)

During 2022, DG Research and Innovation did not sign any grant agreements under Horizon 2020. For the period covering 2014-2022, DG R&I signed its Horizon 2020 grants, on average, after 220 days, and 89% within the target period of 245 days. For the research and innovation family the respective figures were 187 days and 90%.

Table 4a: Horizon 2020 Time-to-Grant

Period	DG Research and Innovation		Research and Innovation family	
	Signed Grant Agreements where TTG <= 245 days	Average TTG for main-listed proposals (days)	Signed Grant Agreements where TTG <= 245 days	Average TTG for main-listed proposals (days)
2014-2022	89%	220	90%	188

During 2022, 86% of the DG Research and Innovation Horizon Europe grant agreements (six out of seven) were signed within 8 eight months from of the respective call deadline, against a target of 100%, with an average of 144.7 days. For the case with extended TTG, this is due to the complexity of the grant.

For the period covering 2021-2022, the respective figures were 90% and 127.6 days.

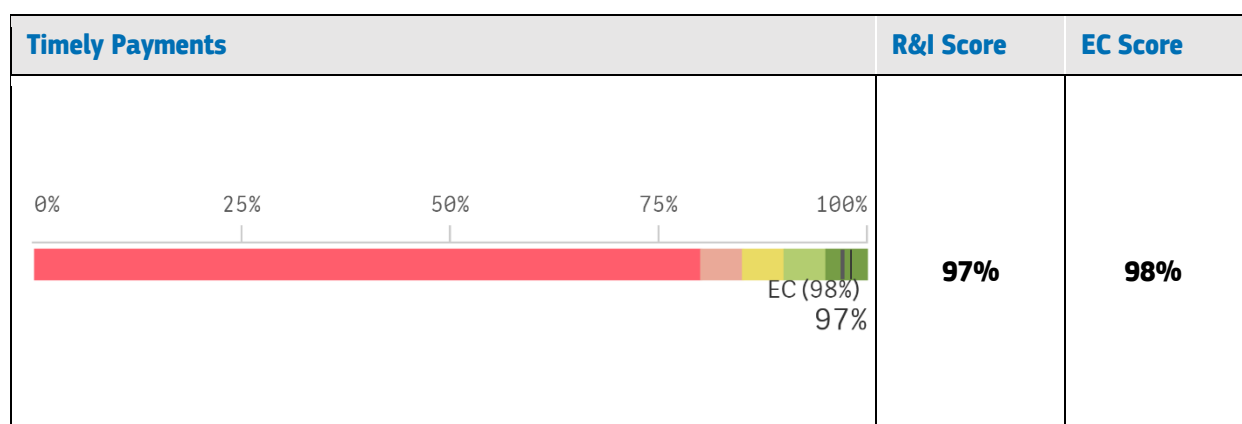
Table 4b: Horizon Europe Time-to-Grant

Period	DG Research and Innovation		Research and Innovation family	
	Signed Grant Agreements where TTG <= 245 days	Average TTG for main-listed proposals (days)	Signed Grant Agreements where TTG <= 245 days	Average TTG for main-listed proposals (days)
2021-2022	90%	127.6	78%	233
2022	86%	144.7	78%	234

Of the 31 Euratom Horizon Europe grants signed in 2022, 30 (96.8%) were signed within 8 months (245 calendar days) of the respective call deadline. The average Time-to-Grant period was 238.4 days. For the period covering 2021-2022, the average Time-to-Grant was 236 days (97% below 245 days).

Time-to-Pay (TTP)

For year 2022, the timely payment score for DG Research and Innovation is 97%, which is very close to the Commission's average⁷⁰.



Joint Undertakings (Art. 187), Public-Public Partnerships (Art. 185) and Executive Agencies

During 2022, significant efforts were undertaken to ensure:

- the signature of the Memoranda of Understanding detailing the general working modalities with the Executive Agencies and the Horizon Europe specific Memoranda defining programme implementation specific aspects. With the exception of the MoU Horizon Europe with EISMEA, which is being finalised in early 2023, all other MoUs were signed.
- setting up the framework of implementation of the Single Basic Act for the Joint Undertakings. Several harmonised templates were drafted, in close cooperation with the operational units in charge of the Joint Undertakings and the Joint Undertakings themselves (i.e. Consolidated Annual Activity Report, Governing Board rules of procedures, Annual Work Programme, Governing Board decisions, In-kind contribution to Additional Activities plan). For a better harmonisation of the procedures under Horizon Europe and following the corporate approach of the funds management, a first version of the IT tool for reporting and controlling the In-kind contribution of Additional Activities has been set-up.
- setting up mutual expectations and common principles for the supervision of the JUs: The CIC prepared a note setting out the general approach on how to ensure efficient and aligned ways of working between the CIC, and more concretely, the Common Service for Funding Bodies (CSFB), and operational units across the Commission, for all horizontal matters related to the Commission's cooperation with the JUs.
- the smooth implementation of European Partnership on Metrology⁷¹, the successor of the article 185 body EMPIR, by preparing the necessary templates (e.g. Financial

⁷⁰ 'Details on the calculation of this Timely Payments' indicator is presented in Annex 4: Financial Scorecard

⁷¹ The Decision (EU) 2021/2084 on the participation of the Union in the European Partnership on Metrology jointly undertaken by several Member States entered into force on 1 December 2021.

Framework Partnership Agreement/Contribution Agreements; the Model Grant Agreement).

DG R&I is coordinating the three-year evaluations for all Executive Agencies which shall be finalised by June 2023.

Joint Undertakings, Public-Public Partnerships and Executive Agencies are supervised and coordinated in an efficient manner.

The Covid-19 pandemic has had a major impact on the implementation of Horizon 2020 health cluster, IMI2 JU and EDCTP2-funded projects. The majority of projects experienced delays in planned activities and several of them were granted no cost extensions, which impacted the management of the 'legacy', increasing the workload and delaying the payment budget execution.

InnovFinn Financial instruments

The Innovfin financial instruments are managed efficiently, in accordance with the delegation agreements concluded with the EIB and the EIF.

2.1.1.3. Economy of controls

This section assesses the costs of the internal control system.

Grant management

In accordance with the Commission central services' guidance⁷², the cost of controls in direct grant management is assessed by the cost of the different control measures. The overall assessment is derived from the ratio between these costs and the total amount paid in the year for grants.

The overall cost of the controls in grant management for DG R&I is estimated at 3.59 % (EUR 6 million in 2022) of the total implemented budget (in terms of payments) in 2022. The increased compared to last year (3.3%) is mainly linked to the increase of the percentage of REA costs for proposal evaluation/selection.

Therefore, the implementation of controls can be considered as a cost-effective operation taking into account the reduction of economy of scale linked due to the delegation of programme implementation to Executive Agencies that took place in 2021.

The detailed calculation of costs of controls for direct grant management is provided in Annex 7 and can be divided into three main categories:

- Costs of controls in DG Research and Innovation;
- Costs of the common support services provided by REA for proposal evaluation/selection;

⁷² Guidance on the estimation, assessment and reporting on the cost-effectiveness of controls- DG BUDG Updated edition – December 2020

- Costs of services for controls provided by the Common Implementation Centre which is hosted by DG Research and Innovation.

Joint Undertakings (Art. 187), Public-Public Partnerships (Art. 185) and Executive Agencies

Total costs for supervision of Joint Undertakings (Art. 187 bodies-JUs) incurred in 2022 by DG Research and Innovation are estimated at EUR 3.95 million, i.e., 0,63% of the payments made to these bodies in 2022.

Total costs of supervision of Public-Public Partnerships (Art. 185 bodies) incurred in 2022 by DG Research and Innovation are estimated at EUR 0.78 million, i.e., 0.43% of the payments made to these bodies. Total costs of supervision of Executive Agencies incurred in 2022 by DG Research and Innovation are estimated at EUR 2.6 million, i.e., 1.28% of the total expenditure sub-delegated by DG Research and Innovation to them, covering also the administrative costs.

Table 7: DG Research and Innovation cost of supervision of Executive Agencies, Joint Undertakings and Public-Public Partnerships

Executive agencies and Indirect Grant Management	Payments (a)	FTE	Total direct costs (b)	Horizontal costs (0,15% of payments see table Y annex 6) (c)	Total costs (b) + (c)	Total costs as % of (a)
Executive Agencies	203.252.812,77 €	16,60	2.293.398,73 €	304.879,22 €	2.598.277,95 €	1,28%
Article 185	182.922.196,96 €	3,70	511.179,24 €	274.383,30 €	785.562,53 €	0,43%
Article 187 (JU's)	629.360.757,67 €	21,75	3.004.904,96 €	944.041,14 €	3.948.946,10 €	0,63%
Total	1.015.535.767,40 €	42,05	5.809.482,93 €	1.523.303,65 €	7.332.786,58 €	0,72%

The supervision of Executive Agencies includes the implementation of their operational budget, which is not a direct part of the DG R&I budget and thus not covered directly by the assurance of this report. During 2022, REA, ERCEA and EISMEA implemented a total of EUR 6 518 million payment appropriations⁷³ from the 2022 operational budget for research and innovation framework programmes. HaDEA and CINEA implemented EUR 4 198 million payment appropriations. These amounts have been taken into account when assessing the cost-effectiveness of supervision.

Overall, the control system put in place for Executive Agencies and indirect management is considered to be cost-effective.

Financial instruments - EIB/EIF:

In the year 2022, DG Research and Innovation's payments to the European Investment Bank (EIB) and the European Investment Fund (EIF) amounted to EUR 261.50 million, out of which the EIB and the EIF deducted EUR 8.7 million for administrative, treasury asset management and policy-related incentive fees.

⁷³ Data from ABAC 03/01/2022

The share of fees of the three instruments in the 2022 payments is 3.3 %, which is within the annual limit and the cumulative threshold. This percentage is higher than historic values due to the low amount of payments in this non active/ legacy period and to cashing in arrears from previous periods. These fees were withdrawn from the EU account according to the terms of the Delegation agreements, which were drafted specifically for the sound management of funds.

The amounts transferred for the management and other fees payable each year vary. For this reason, a full account of the share of management fees out of the total implemented amounts will only be possible upon the closure of the programme.

During 2022, the designated services (EIF and/or EIB) recovered EUR 0.7 million from the Seventh Framework Programme Risk-Sharing Finance Facility (RSFF) reflows, EUR 6.7 million from InnovFin SMEG treasury income, EUR 1.3 million from the InnovFin IFE treasury income.

The supervision of the activities implemented by the EIB and the EIF was carried out in 2022 by 0.2 Full Time Equivalent DG Research and Innovation staff. The total cost of this supervision were estimated at EUR 0.03 million in addition to the costs of the horizontal control tasks estimated at EUR 0.39 million (0.15% of payments). See table Y in Annex 7.

2.1.1.4. Conclusion on the cost-effectiveness of controls

Based on the most relevant key indicators and control results, DG Research and Innovation has assessed the effectiveness, efficiency and economy of its control system and reached a positive conclusion on the cost-effectiveness of the controls for which it is responsible.

The first objective of the control system is to achieve the main policy objective – to create growth and jobs, in particular, by contributing to more and better research and innovation in Europe. In this sense, the controls aim to ensure good work programmes, to select the best proposals to be funded and to verify the project's deliverables.

The second objective of the control system is to ensure that the EU contribution paid to the beneficiaries complies with the internal control objectives. Thus, that legal and regular transactions are carried out in a cost-effective way.

Overall, given:

- the achievements of research and innovation policy as set out in Part 1,
- the quantitative and qualitative benefits arising from the control systems adopted (common approach on processes and interpretation of rules thanks to the Common Implementation Centre, quality of proposals due to reviews which are performed by panels of independent external experts in the scientific field complemented by a real competition for funds, amount of rejected funding following ex-ante checks, and the amount recovered following the implementation of audit result),

- the error rates, which are at levels considered as being appropriate when balanced 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 the cost-effective control system in place is balanced with the objectives of the research and innovation policy.

The same conclusion applies to the InnovFin financial instruments (managed in accordance with the delegation agreements concluded with the EIB, EIF), the Joint Undertakings (Article 187 bodies), the Public-Private Partnerships (Article 185 bodies) and the Executive Agencies. These are monitored in conformity with the supervision arrangements described above and in a cost-effective manner.

2.1.2. Audit observations and recommendations

This section sets out the observations, opinions and conclusions reported by auditors – including the limited conclusion of the Internal Auditor on the state of internal control. Summaries of the management measures taken in response to the audit recommendations are also included, together with an assessment of the likely material impact of the findings on the achievement of the internal control objectives, and therefore on management's assurance (Annex 7).

Internal Audit Service (IAS)

According to the IAS, DG R&I's internal control systems in place for the audited processes proved to be effective with the exception of the observations giving rise to one critical recommendation related to the audit on the design and early implementation of the European Innovation Council (EIC) and five very important recommendations (two very important recommendations related to the audit on the design and early implementation of EIC, one very important recommendation related to the audit on Performance Framework for Research, and two very important recommendations related to the audit on Personal Data Protection under the responsibility of the Executive Agencies and the CIC).

Action Plans for all three IAS audits have been defined. The one for the audit on Personal Data Protection is being implemented, while the ones for the audit on the design and early implementation of the EIC, and the audit on Performance Framework for Research have been sent for validation to the IAS.

The very important recommendations related to the audit on "Personal Data Protection under the responsibility of Executive Agencies and the CIC" are the following:

Recommendation No 1: 'Controllershship of the funding and tenders' portal' (rated 'very important'):

Recommendation No 2: 'Transfer of personal data to third countries' (rated 'very important').

The critical and very important recommendations addressed to DG R&I related to the audit on “the design and early implementation of the European Innovation Council” (EIC) are the following:

Recommendation No 1: ‘Governance framework of the EIC programme’ (rated ‘critical’):

Recommendation No 2: ‘Roadmap for the transition to the long-term solution for the EIC Fund’ (rated ‘very important’).

Recommendation No 11: ‘Assurance building blocks (reporting process and monitoring of the administrative budget) (rated ‘very important’).

This report also issued a critical recommendation for EISMEA on the “design of the EISMEA’s internal control environment in relation to the EIC”.

The very important recommendation related to the audit on “Performance Framework for Research” is the following:

Recommendation No 2: ‘Reporting on Horizon programmes’ (rated ‘very important’):

Further information on the IAS recommendations is available in Annex 7.

European Court of Auditors (ECA)

For the financial year 2021, the Court reported a 4.4%⁷⁴ error level for Chapter 4 stressing that research and innovation expenditure (FP7 and Horizon 2020) remains a higher-risk area and the main source of error in this chapter.

Regarding the 2021 DG R&I Annual Activity Report, the Court concluded that it gave a fair assessment of the DG’s financial management in relation to the regularity of underlying transactions.

The Court issued five recommendations, which the Commission accepted and are currently being implemented. Annex 7 presents the Court’s recommendations and the respective Action Plan drawn by the responsible Commission services.

The main theme of Annual Performance Report 2021 was the mainstreaming of horizontal policy priorities into the EU budget. It is presented in Annex 7.

Furthermore, in year 2022, four performance audits related to DG Research and Innovation activities were finalised⁷⁵:

⁷⁴ This level of error, although higher than the one reported in 2020 (3.9%), is in the same order of magnitude as those reported in previous years (2015 (4.4%), 2016 (4.1%) 2017 (4.2%) and 2019 (4%).

⁷⁵ The synthesis is presented in Annex 7

- a) Synergies between Horizon 2020 and European Structural and Investment Funds - Not yet used to full potential
- b) Measures to widen participation in Horizon 2020 were well designed but sustainable change will mostly depend on efforts by national authorities
- c) Climate spending in the 2014-2020 EU budget- Not as high as reported
- d) SME internationalisation instruments - A large number of support actions but not fully coherent or coordinated

Several performance audits are ongoing inter alia on the EU 's industrial policy on Batteries, Circular Economy, Offshore renewable energy in the EU, Smart Cities, and Recoveries. Furthermore, one performance review on Digitalising the management of EU fund is ongoing.

Overall conclusion on audit observations and recommendations

Internal and external audit work contributes significantly to continuous improvements in DG Research and Innovation systems and operations. The Directorate-General systematically addresses and follows up the recommendations submitted by the IAS and the European Court of Auditors. The current residual risk from the audit recommendations that remain open in DG Research and Innovation leads to a reservation on reputational grounds.

2.1.3. Assessment of the effectiveness of internal control systems

The Commission has adopted an Internal Control Framework based on international good practice, to ensure the achievement of its policy and management objectives. Compliance with the internal control framework is a compulsory requirement.

DG Research and Innovation uses the organisational structure and the internal control systems suited to achieving its policy and internal control objectives in accordance with the internal control principles and has due regard to the risks associated with the environment in which it operates.

The internal control assessment was performed in compliance with the methodology established by DG BUDG⁷⁶. It was based on an evaluation of monitoring indicators defined in the DG Research and Innovation Internal Control Framework and a desk review of the analysis of information from various sources such as:

1. the indicators set out in the Internal Control Framework of the DG;
2. the Directors' reports for 2022 and the 2022 risk assessment exercise at Directorate-General level;
3. the reports on recorded exceptions⁷⁷, non-compliance events and any cases of confirmation of instructions (art 93.2 FR);

⁷⁶ Implementation guide of the internal control framework of the Commission.

⁷⁷ Additional information on the two recorded exceptions are provided in Annex 8.

4. the observations and recommendations reported by the Internal Audit Service and conclusion of the Internal Auditor on the state of internal control in DG Research and Innovation;
5. the observations and recommendations reported by the European Court of Auditors;
6. the DG BUDG reports on follow-up of recommendations on the validation of Local Systems;
7. the error rates for the Seventh Framework Programme, Horizon 2020 and the Research Fund for Coal and Steel.

DG Research and Innovation has assessed its internal control system during the reporting year and has concluded that:

1) it is effective and the components and principles are present and functioning well overall, but some improvements are needed as some deficiencies were identified related to

- **reporting on Horizon programmes** (review of the process for verifying the data that feed into DG R&I's contribution to the Annual Management Performance Report (AMPR) and Performance Programme Statements (PPOs) and maintain an adequate audit trail for the figures disclosed in the AMPR/PPO and programme statements);
- **transfer of personal data to third countries** (ensure that transfers of personal data through the FTOP to third countries are either avoided or, if not possible, take place exclusively using proper transfer tool as per the EUDPR);
- **the Controllership of the funding and tenders portal.**
- **governance framework of the EIC programme** (The design of the governance framework of the EIC programme is not yet finalised, therefore key aspects of governance cannot be implemented or adequately performed. This could potentially jeopardise the effectiveness and efficiency of the decision-making process, and may negatively impact the implementation of the EIC programme. Moreover, resource constraints in DG R&I stemming from the secondment of experts to EISMEA may lead to inadequate cooperation, supervision, and monitoring of the preparation of the EIC work programme and its implementation. Potentially, this could result to an ineffective management of the EIC programme, including the EIC Fund, thus affecting the implementation of the Accelerator and in particular its investment component).

The improvements and/or remedial measures implemented or envisaged are:

- Review of the process for the validation of the data used in reporting (including AMPR/PPOs).
- Ensure that transfers of personal data through the EU Funding and Tenders Portal to third countries take place exclusively using a proper transfer tool as per the EU Data Protection Regulation 2018/1725.
- The Director of CIC, as Chair of the eGrants and eProcurement Steering Board, will finalise the Joint-Controllership Arrangement covering all onboarded parties and all jointly processed personal data operations via the EU Funding & Tenders Portal.

Together with EISMEA and DG CNECT, implement the Action Plan of the IAS audit on the design and early implementation of the EIC, in particular to finalise the Memorandum of Understanding for Horizon Europe; to revise the Delegation instrument (Commission Decision C(2021)949), accounting for the governance of the EIC Fund, and ensuring clear definition of the roles and responsibilities of DG R&I and EISMEA. Furthermore, clear rules on the conflict of interest, (in)compatibility between functions will be defined.

2.1.4. Conclusion on the assurance

This section reviews the assessment of the elements already reported above (in Sections 2.1.1, 2.1.2 and 2.1.3), and the sub-conclusions already reached. It draws an overall conclusion to support the declaration of assurance and whether it should be qualified with reservations.

Based on the analysis of the results of the controls in place shown in the indicators outlined above, and the examination of the evidence available, DG Research and Innovation's management is in a position to provide **reasonable assurance on the following areas:**

- policy-development activities;
- the processes relating to the selection of contractors and beneficiaries and the underlying financial operations (legal and financial commitments);
- payments relating to administrative expenditure and procurement;
- Horizon 2020, Euratom and Horizon Europe payments for grants;
- management of the RSFF/INNOVIN financial instruments and the underlying financial transactions with the EIB and EIF;
- payments to Joint Undertakings and Article 185 initiatives;
- the operating subsidy paid to the Executive Agencies.

Because of the 'de minimis' threshold for financial reservations introduced in 2019⁷⁸, a quantified reservation is no longer needed for the Seventh Framework Programme.

DG Research and Innovation considers that its overall control strategy is appropriate as it ensures a good balance between low errors and efficient controls at a reasonable cost. However, as a result of the weaknesses identified on the governance and control systems of the implementation of the investment component of the Accelerator scheme within the EIC Programme, a reservation on reputational grounds has been issued.

⁷⁸ According to this threshold, quantified AAR reservations related to residual error rates above the 2% materiality threshold, are deemed not substantial for segments representing less than 5% of a DG's total payments and with a financial impact below EUR 5 million.

Overall conclusion

In conclusion, based on the elements reported above, management has reasonable assurance that, overall, suitable controls are in place and working as intended except for the deficiencies related to the design and implementation of the investment component of the EIC Accelerator scheme. However, an Action Plan has been approved and is currently being implemented. Consequently, risks are being appropriately monitored and mitigated. Therefore, the Director General, in his capacity as Authorising Officer by Delegation has signed the Declaration of Assurance albeit qualified by a reservation on reputational grounds concerning the late implementation and weaknesses affecting the governance and control systems of the investment component of the Accelerator scheme of the European Innovation Council (EIC) Programme within Horizon Europe, delegated to the European Innovation Council and SMEs Executive Agency (EISMEA).

2.1.5. Declaration of Assurance

I, the undersigned,

Director-General of Research and Innovation

In my capacity as authorising officer by delegation

Declare that the information contained in this report gives a true and fair view⁷⁹

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 work 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 reservation should be noted:

The Director-General, in his capacity as Authorising Officer by Delegation, has signed the Declaration of Assurance albeit qualified by a reservation on reputational grounds concerning the late implementation and weaknesses affecting the governance and

⁷⁹ True and fair in this context means a reliable, complete and correct view on the state of affairs in the DG/Executive Agency.

control systems of the investment component of the Accelerator scheme of the European Innovation Council (EIC) Programme within Horizon Europe, delegated to the European Innovation Council and SMEs Executive Agency (EISMEA).

More details are provided in Annex 9.

Brussels, 03 April 2023

[Signed in ARES]

Marc Lemaître

Director-General DG Research and Innovation

2.2. Modern and efficient administration – other aspects

Human resource management

In year 2022, several elements impacted the activities and respectively the working modalities in the Directorate-General such as the continuation of the COVID-19 pandemic at the beginning of the year, or the adoption of the Communication on the new Human Resources Strategy of the Commission, the new rules on working modalities and hybrid work, and the Communication on Greening the Commission.

Despite continuous challenges, the results of the 2021 Staff Survey have shown that staff satisfaction ratings improved overall across most themes compared to the previous one in 2018. The DG became a more collaborative, trustful, and inclusive workplace with better role clarity and job content. Staff appreciated in particular the response of Middle Managers. Furthermore, the staff engagement index (70%) increased by 8%, compared with 2018. This result was due to an improvement in all areas contributing to staff engagement, in particular more staff feel that their work is recognised and praised, their opinion is valued, their colleagues are committed to do quality work, their managers care about them as a person. However, less staff considered that they have an acceptable workload and that they achieve a good balance work life and private life.

Following the results of the 2021 Staff Survey and the adoption of the decision on Working time and hybrid working, a reflection process, via an inclusive and participatory approach, was launched to take stock of the needs, the opportunities and the challenges of the DG, aiming at identifying the priorities for the next period and the appropriate actions.

The reflection process started with focus group discussions, where staff was grouped per type of responsibilities. The focus groups identified the priority areas and the challenges, which were afterwards addressed in workshops open to all staff and management. Around 250 staff participated in the workshop open to all staff, showing the high motivation and engagement in this process. As a result of the staff consultation process, concrete actions were identified and translated in an Organisational Development Action Plan of the DG. This Plan was endorsed by the management and presented to all staff in a Town-Hall meeting. Several actions of this Action Plan concern Human Resources and will be integrated in the local HR Strategy of the DG.

With reference to the middle management appointments, the DG exceeded by three the target of 7 of first female appointments by the end of 2022.

All relevant HR matters were timely and properly communicated to staff via a variety of means, such as regular HR news in the internal newsletter (i.e. RTD Insights), creation and update of web pages, video messages from senior management, as well as discussion forums (e.g. Coffee seminar).

Digital transformation and information management

The IT Department continued to lead the corporate IT suite for grant management (eGrants, including the eExperts application), ensured smooth operation and continuous enhancement of **the Funding and Tenders Portal** and made important contributions to corporate projects such as **eProcurement and Compass Corporate** (for the digitalisation of workflows). The eGrants IT tools and the portal are moving from 28 Commission programmes under the MFF 2014-20 to 69 EC programmes under MFF 2021-27. In 2022, the CIC continued to adapt eGrants and the Funding and Tenders Portal to the needs of Horizon Europe and the MFF 2021-2027. The eExperts tools continued to be reengineered as a future-proof platform, to support further functional and technical evolutions. The on-boarding of new organisations and new programmes is also an on-going activity which continued in 2022 and beyond.

The CIC launched **the Client-Centric Initiative** with the aim to make the services of the CIC evolve and the Funding and Tenders Portal to be even more client-centric – for applicants, beneficiaries, experts, NCPs (National Contact Points), policy makers, investors, media, citizens and other stakeholders. The goal is to enable a smoother real-time engagement with clients and stakeholders with better relevance and matching of content with the users' interests. So far, a general survey has been published to which 2620 users responded. Analysis is underway. In parallel, group interviews have been conducted to gain a more qualitative perspective from users. Both the survey and the group interviews addressed the most frequent users. Efforts will be invested in gaining insight on the needs and difficulties of the less frequent users/newcomers. A business case based on the proof of concept to increase relevance of call topics to users' interests (recommendation system) was prepared. The initiative was presented to Horizon Executive Committee in June 2022 and the business case was presented to the Information Technology and Cybersecurity Board (ITCB) in October 2022 with positive feedback.

The CIC followed-up the implementation of and compliance with the targets set in **the Commission's Data Protection Action Plan** (C(2018) 7432, as reviewed C(2020) 7625) by:

- ensuring the compliance with the EU Data Protection Regulation of all processing agreements concluded by the DG as controller or as processor;
- keeping up-to-date the full inventory of the processing operations of the DG;
- ensuring the application of the internal administrative practice of the DG facilitating the exercise of the data subjects rights;
- allocating appropriate resources to fulfil all Data Protection Coordination tasks, including a clear reporting line to senior management on all data protection issues;
- organising one corporate personal data protection awareness-raising activity and seven data protection awareness-raising sessions in the DG to 153 participants.

It has also provided comments to the proposed Regulation on the European Health Data Space.

Progress has been made **on data governance**, in particular for personal data and data security. But a number of elements of data governance (clarification of data ownership, data

stewards, proper governance in the multi-DG context, etc.) still need analytical work and developments, that have not been possible so far.

Sound environmental management

In 2022, DG R&I has decided to contribute to the EC climate neutrality goal and it has actively contributed to **the EMAS network requests**, both participating and sharing fruitful comments at the EMAS Director's Committee, EMAS Network and EMAS training meetings, as well as being involved and promoting the different initiative and campaigns at various level.

DG R&I organized two info sessions inviting the DG HR EMAS coordination team to explain the proposed and approved text on the Communication on Greening the Commission. Two staff consultation followed to contribute to the Inter-service consultations on this Communication. After the final text of the Communication was adopted on 5 April 2022, DG R&I went through a participatory process whereby DG R&I staff designed **the "DG R&I Greening Strategy 2022 – 2024"** and its action plan, approved by the DG R&I senior management in July 2022. In view of the 2022 ongoing actions and targets were partially adjusted to those decisions.

Some major actions were taken by DG R&I to contribute to the EC objective to become climate neutral by 2030:

- 2022 has begun with an R&I Staff video on how to sort the waste in our offices.
- A collection of small electric items was organized on February, in collaboration with JRC for the CDMA building, in favour of a social association while contributing to the circular economy. While for the Waste reduction campaign at the end of the year DG R&I hosted two workshops on upcycling textiles and a Repair Café info session.
- In May 2022, DG R&I formally pledged to implement the principles outlined in the "Guidance note on business travel and external experts' travel in the framework of greening the Commission" of DG HR and informed the DG R&I staff on the application of these instructions.
- To reduce the energy consumption, in March 2022, DG R&I has communicated to OIB the decision to decrease by 1° the temperature of heating during winter and of cooling during summer in ORBN and to shorten the heating and ventilation time slots from 8 am until 6pm, except on Mondays when it starts at 7 am. Those measures will result in an annual saving of 20.000 kWh of electricity, 16.000 kWh of gas and more than 15 Tons CO2 equivalent, which will be not emitted in the atmosphere. DG R&I has also adhered to the BEST winter action. Those measures were communicated to all the DG R&I staff via a dedicated e-mail.
- Large events co-organized or organized by DG R&I have put special attention on sustainable measures, for example, **the New Bauhaus Festival** in June 2022, where 100% of material was reused or recycled, and the European Research and Innovation days in September, which had a whole dedicated communication strategy.

- Specific actions to promote sustainable commuting were also organized: a video with two colleagues inviting staff to participate to **Velomai** was made and a bike ride combined with the visit to BIGH – Aquaponics farm as the Velomai closing event. For the European Mobility week a bike ride combined with a guided tour at the Gare Maritime, was organized.
- The Greening DG R&I intranet page has been revised and updated.

DG R&I continues to use the available corporate eProcurement tools. All open procedures are launched using the Public Procurement Management Tool (PPMT) and the tenders are submitted via eSubmission. Opening sessions are organised online via My Workplace and eSignature is used for the signature of the contracts. The applicability of corporate eProcurement tools is expanding, including new types of procedures, which can be managed electronically. When drafting tender specifications, the environmental considerations and relevant commission guidelines are taken into account to the furthest extent possible. Considering that a majority of the procedures are for service contracts (e.g. consultancies, studies), the Public Procurement sector encourages policy units to organise the majority of the events/workshops online, avoid printing out any reports and to reduce number of travels by the contractors.

Examples of economy and efficiency

On human resources and **the organisational development process of DG R&I**, a reflection exercise and a discussion to take stock of the needs, opportunities, and challenges for the DG were a success story, highly appreciated by staff. Around 250 staff participated in the workshop open to all of them, showing their high motivation and engagement in this process. This also gave legitimacy to the matters raised during the discussions. The purpose of the process was to identify the top priorities related to organisational development for the next two years and to take appropriate actions via an inclusive and participatory approach.

DG R&I has also organised the 4th edition of **the European Research and Innovation Days**, the European Commission's annual flagship Research and Innovation event, bringing together policymakers, researchers, entrepreneurs and the public to debate and shape the future of research and innovation in Europe and beyond. The event **took place online** on 28 and 29 September 2022, and had a huge success allowing everyone to get involved from anywhere, and reached 14.000 registrations. On the occasion of the R&I Days, the DG launched the **R&I Exhibition**, showcasing 45 projects that are paving the way to achieve the **EU Missions' goals**. The exhibition's campaign lasted until December 2022 and reached 235,000 views and its promotion achieved over 52 million impressions on social media.