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To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
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Subject:	COMMISSION STAFF WORKING DOCUMENT EXECUTIVE SUMMARY OF THE EVALUATION Accompanying the document REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Ex-post evaluation of Horizon 2020, the EU Framework Programme for Research and Innovation

Delegations will find attached document SWD(2024) 30 final.

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COMMISSION STAFF WORKING DOCUMENT

EXECUTIVE SUMMARY OF THE EVALUATION

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Ex-post evaluation of Horizon 2020, the EU Framework Programme for Research and Innovation

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This summary presents the main findings of the **final evaluation of Horizon 2020** - the EU's eighth research and innovation funding programme, with a budget of EUR 75.6 billion for the period 2014-2020. The core mission of the programme was to drive economic growth and create jobs through research and innovation (R&I) with a strong emphasis on excellent science, industrial leadership and tackling societal challenges.

This evaluation looks into the impacts of Horizon 2020 until 2023, building also on lessons from its predecessor FP7 and the interim evaluation performed in 2017. The evaluation also assesses the efficiency of the programme, its coherence with other initiatives, relevance to societal needs and the overall added value it brings to the EU. As 41% of Horizon 2020 projects were still running at the time of the final evaluation, the programme's impacts are still evolving and will continue to yield results for the years to come. This makes any monitoring or assessment exercise particularly challenging. This evaluation is thus underpinned by an extensive body of evidence, with over 1000 interviews, surveys of successful and unsuccessful applicants and a mix of quantitative and qualitative evaluation methods. It also builds on a large open public consultation with close to 2000 replies.

The analysis shows that the programme garnered **immense interest,** attracting over one million individual applications from 177 countries. It funded almost 35 000 projects involving 40 000 organisations. Overall, an additional **EUR 159 billion would have been needed to fund all the high-quality proposals submitted**.

Scientific impact

Horizon 2020 was strategically designed to strengthen Europe's scientific and technological bedrock by investing in knowledge, skills and infrastructure. These long-term investments are critical for the EU's current and future ability to lead, react or adapt to dynamic changes in scientific and technological advancement and the ever-changing socio-economic environment.

The programme outperformed its predecessor (FP7) on scientific output, as evidenced by the number of **scientific publications**, which **are cited twice as often as the global average,** and 4% of which are the most cited worldwide. Horizon 2020 **made substantial contributions** to **scientific breakthroughs and advancements in nascent domains** of science and technology, particularly in medical sciences, quantum mechanics, chemical engineering and composite materials. Funding for transnational R&I projects enabled significant collaborations that might not have been possible otherwise. More than a quarter of the publications are linked **to new, rapidly evolving research areas.** The programme played a key role in fostering world-class scientific excellence: 33 Nobel Prize winners were supported either before or after they were honoured.

The programme also had a **profound impact on knowledge circulation,** with 82% of its publications being freely and publicly available online, demonstrating a strong commitment to **open access.** Horizon 2020 was also pivotal in **diversifying and enhancing researchers' skills and knowledge**. **It also improved their career prospects, particularly benefiting early-career researchers**. Nearly 50 000 researchers were supported in cross-sector and cross-country mobility. In addition, the programme enabled the EU to develop and upgrade **large-scale research infrastructure** at both European and global level: over 24 000 researchers and organisations gained access to these infrastructures, expanding opportunities for collaborative work and scientific advancements. These are noteworthy achievements, though the evaluation suggests that **greater synergies could be made between EU, national and regional programmes** for research infrastructure, in particular to ensure their operations are sustainable.

Societal impact

Horizon 2020 bolstered research and innovation efforts aimed at **tackling key societal challenges**, including health, food security, energy, transport, environmental sustainability, climate action, inclusive societies and security.

Particularly noteworthy is Horizon 2020's crucial role in **advancing our understanding of climate change**. Its investments, building on the foundations laid by the predecessor programme FP7, have been influential, with 10% of the scientific publications cited by the Intergovernmental Panel on Climate Change originating from these two programmes. With 32% of its funding allocated to climate action Horizon 2020 has also been instrumental in supporting the development of practical solutions. A prime example is the progress made in alternative and low-emission fuels. The programme also demonstrated adaptability in responding to emerging **health crises**. It responded promptly by launching specific calls for proposals during the Ebola and Zika epidemics, and even greater agility in responding to the COVID-19 pandemic. Horizon 2020 and FP7 are recognised as the third most frequently acknowledged funding sources for COVID-19 related research in the world. The programme also funded research to gain a deeper understanding of **rare diseases** and fostered the development of related therapies, contributing to advancements in personalised medicine and patient care.

By improving fishing methods and reducing discards, Horizon 2020 has contributed to more **sustainable fishing** practices, balancing economic interests with environmental conservation. The programme supported the development of a **smart European electricity grid**, funding projects that focus on automation, energy storage integration and the adoption of renewable energy sources to aid the transition to a more sustainable energy system. Horizon 2020 played a role in improving urban transport by supporting **sustainable urban mobility** plans, including well-designed parking measures and cycling infrastructure to help improve urban liveability and sustainability. The programme supported the development of solution addressing the **human aspects of digital transformation**, such as the development of safe and user-friendly robotics. It improved the accessibility and inclusiveness of cultural spaces, enriching **cultural heritage** experiences and giving access to a broader audience. The programme helped make Europe **more secure** by supporting crime prevention and counter terrorism initiatives, improving border surveillance and improving disaster resilience.

Showing commitment to interdisciplinary research, Horizon 2020 significantly raised the role of **social sciences and humanities** disciplines i.e. sociology, economics, psychology, political science, history and cultural sciences, allocating over 20% of its budget to related topics. However, the evaluation reveals that the level of integration of social sciences and humanities was uneven across different parts of the programme areas. As regards **gender equality** the balance improved under Horizon 2020, with the share of women in evaluation panels reaching 42%. However, the share of women in scientific advisory panels and as researchers in projects remained below the 50% target, at 43% and 23% respectively, showing room for improvement.

Economic impact

Horizon 2020 made a **significant contribution to the European economy**, not only by stimulating employment and economic growth, but also by effectively **leveraging private funds and boosting the productivity of the companies involved**. It has generated the development of **thousands of innovation outputs**. Looking at the long-term effects of the programme it is estimated to contribute an average **annual increase of EUR 15.9 billion to EU GDP**, totalling EUR 429 billion over the period 2014-2040. Horizon 2020 is also expected to have had a notable impact on job creation, with a net gain in employment levels reaching around 220 000 employees at its peak. In monetary terms, **for every euro the programme is**

estimated to cost society (in programme costs and costs to applicants), it is estimated to yield five euro in benefits to EU citizens in the period up to 2040.

On top of its nominal budget, **Horizon 2020 contributed to increasing R&D spending in Europe by attracting co-investment from both public and private sectors**. The greatest leverage was achieved in European partnerships: in joint undertakings, private partners contributed resources (in cash or in kind) that more than doubled or even tripled the volume of EU funding. Moreover, the programme impacted the **economic performance of participating companies**. They saw on average a 20 % employment rise and a 30 % increase in turnover and total assets, compared to the firms that did not receive funding despite high quality applications. The programme also made a significant contribution to **intellectual property rights (IPR)** developments. Programme beneficiaries reported close to 4 000 IPR applications, of which three quarters are for patents, followed by 12% for trademarks.

The interim evaluation of Horizon 2020 identified a notable gap in venture and growth capital in the EU to scale up innovations. To help bridge this gap, a pilot started to run the European Innovation Council (EIC) in the last three years of Horizon 2020. Early indications show that **the EIC pilot had a positive impact on the turnover and staffing levels of its beneficiaries**. It also **tackled a critical funding gap** in high-risk areas where limited alternatives are available at national and regional levels. The Horizon 2020 financial facility leveraged EUR 77.5 billion in debt and equity for over 38 000 organisations, well above its targets, and fostered the development of venture capital ecosystems and networks.

While Horizon 2020 made strides in **bridging the gap between high-quality European research and market innovations**, it has not fully closed this long-standing gap. Measures tracking the spread of innovation suggest that the EU improved its performance during the Horizon 2020 implementation period, yet it still trails behind its main international competitors on this aspect.

Horizon 2020 provides high value-for-money for European society. It significantly enhanced the scope and quality of research and innovation in Europe, and supported larger-scale, more complex and more ambitious R&I activities than would have been possible without EU support. It fostered multidisciplinary collaboration and pan-European collaboration, and competition in R&I. The evaluation concludes that Horizon 2020 significantly contributed to leveraging R&I funding, it supported the implementation of other EU policies and remained relevant to social needs. The evaluation underscores the need to sustain action across multiple framework programmes to achieve these outcomes.

The evaluation identified the following **areas for improvement:** to broaden participation, further simplify and reduce the administrative burden, to reinforce the dissemination, exploitation and deployment of results, to support the participation of women and to enhance synergies with other initiatives at EU, national and regional level. The insights and key conclusions derived from this final evaluation of Horizon 2020 are set to play a crucial role not only in shaping the ongoing implementation of Horizon Europe, but also in influencing the policy development for future research and innovation initiatives. This ensures that lessons learned from Horizon 2020 are effectively integrated into current and future programmes, enhancing their efficiency, relevance and impact on Europeans.